1378

Scientific Review

AND

SCIENTIFIC AND LITERARY REVIEW,

A RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,

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APPLICATIONS FOR LETTERS PATENT.

⁂ In this list (Com.) means Invention communicated from abroad.

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On June 8th.—1977 to 1996.—J. Kirkland and J. Anderson. Machinery or apparatus employed for the cutting or sawing of timber.—J. West. Apparatus used in the manufacture of gas.—W. F. Bateman. Method of and apparatus for cutting leather strapping for joints.—G. Nimmo. Furnaces for the prevention of smoke.—E. Lowe and J. S. Beatson. Machinery and apparatus employed in puddling iron.—J. Boyd and T. A. Boyd. Moulds for casting, and apparatus therefor.—J. T. Dann. Construction of apparatus for lighting, extinguishing, and regulating gas flames (com.)—F. Zysel and J. Funkenstein. Cooking utensils made of tin or tinned iron.—J. G. Smeaton. Construction and arrangement of apparatus for combining the supplies of hot and cold water to houses and other buildings, and in applying and utilizing the same for extinguishing fire.—H. W. Price. Clamps or instruments for holding fabrics or other flexible materials while being sewn or stitched, and for other like purposes.—W. Fijou. Safety and equilibrium valves.—H. B. Barlow. System of malting, and the apparatus employed therein (com.)—J. Duncan. Treatment of sugar and of cane juice.—J. H. Johnson. Turn-up or folding bedsteads (com.)—A. Waithman. A description of twine or cord.—W. T. Walker. Method of working gas purifiers.—W. R. Lake. Clothes wringers, parts of which are also applicable to other apparatus or machinery (com.)—A. Coulter. Automatic coupling of railway and other carriages.—A. M. Clark. Printing ink (com.)—A. M. Clark. Manufacture of screw nuts (com).

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On June 10th.—2007 to 2031.—R. Lester and W. L. Fallows. Furnaces for rotatory, puddling, or other machines.—E. Kauffmann. Lamp burners (com.)—J. Casthelaz. Preparation of products of aniline and matters from which aniline is or may be derived, suitable to be used in dyeing and printing, and preparation of colouring matters.—W. Seaton. Construction of the permanent way of railways. A. M. Festing. Improved blind pulley.—I. M. Singer. Harness for horses, mules, or other animals.—N. Black and A. Leiper. Apparatus for economising fuel and preventing smoke in boiler and other furnaces, and in domestic and similar fire-places.—J. Bélicard. Machinery or apparatus for weaving and cutting velvet and other piled fabrics.—R. Applegarth. Communication by means of speaking tubes, applicable to apparatus for supporting respiration under water (com.)—W. Hunt. Manufacture of sulphate of soda and sulphate of potash. —H. W. Heale and E. D. Gowan. Manufacture and construction of taps or valves.—J. Hargreaves and T. Robinson. Manufacture of sulphates, and apparatus employed therein.—N. Greening and J. Greening. Wire belting used for elevating and other analagous purposes.—E. Johnson. Ventilator for sewers and drains.—B. Turner. Door hinges.—W. Mather and J. Dodge. Steam generators, and apparatus connected therewith.—C. Parkinson and R. H. Lord. Carding cotton and other fibrous substances.—C. J. Crosfield, J. Barrow, and E. A. Cook. Treatment of animal charcoal used in the decolorization of sugar solutions.—J. Harrington. Means for adjusting and fixing knobs or handles on the spindles of mortise and other locks or fastenings.—J. Harrington. Gasaliers. —P. Brannon. Manufacture of domestic and office furniture, and other useful and ornamental articles, and the employment of certain materials and apparatus therefor.—P. Brannon. Hulls of ships and other buoyant structures.—P. Brannon. Construction of safes and strong rooms.—G. J. Jacobson. Manufacture of soft white soap.—J. Head. Apparatus for feeding steam thrashing machines, which apparatus acts also as a safeguard for the attendants against the danger of falling on to the thrashing drum.

On June 11th.—2032 to 2037.—A. Herzen. Preserving fresh uncooked meat and other animal food, and antiseptic mixtures for that purpose.—P. Brannon. Construction and surfacing of roads, and apparatus therefor.—W. D. Cliff. Machinery for making clay retorts and other similar heavy articles made from clay.—A. Styles, jun. Trollies or tipping waggons for discharging coal, earth, and other similar bodies.—T. McLuckie. Making tobacco pipes, and apparatus therefor.—M. A. Soul. Engine or apparatus in which steam or uncondensable gas is to be used as the motive power, to be called "the Asolena engine or apparatus" (com.)

On June 12th.—2038 to 2053.—W. Simons and A. Brown. Dredgers and dredging, and machinery or apparatus employed therefor.—C. J. Coxhead. Pianofortes.—J. Miller and G. Miller. Purifying paraffin, and apparatus therefor.—A. M. Clark. Railway and other carriage springs (com.)—J. E. Wilson. Propelling vessels.—G. K. Billings. Stirrup bar.—B. L. Thomson. Protecting the inner surfaces of iron or composite ships or vessels.—A. Chambers. Mode of and apparatus for railway signalling.—R. Lublinski. Umbrella tip fastener.—A. B. McGrigor. Artificial stone, and the modes and means of manufacturing the same (com.)—F. L. H. Danchell. Treatment of peat, and machinery and apparatus to be used therein.—P. J. Lack. Valves for regulating the supply of gas, and other fittings connected with gas burners.—W. E. Newton. Compound engines (com.)—W. E. Newton. Pulp strainers (com.) —W. M. Scott. Breech-loading small arms.—M. M. Harris. Obtaining perfumes, scents, and essences by distillation under vacuum, applicable also for obtaining tinctures and extracts of various kinds (com.)

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On June 15th.—2067 to 2078.—R. Copping and J. Walworth. Apparatus for preparing wheat before grinding. (Complete specification.)—G. R. Hugon. Machine to disintegrate or extract the Ramie fibre from the inner wood and outer bark of the Ramie plant in its green state, and also to extract the fibre from all other textile plants in their green state (com.)—G. H. Lloyd. Steam boilers or steam generators.—S. C. Armitage. Self-regulating horse-hoes.—C. Rumpff. Dry process of oxidising "anthracene," and improvements in the manufacture of dyes and other colouring matters from the product so obtained (partly com.)—J. James. Manufacture of cylindrical boxes from sheets of metal or other material, and apparatus therefor. —C. M. Roullier. Machinery for fixing heels to boots and shoes.—J. Muirhead. Iron telegraph poles.—W. R. Lake. Machinery for manufacturing spikes (com.)—H. Warner, H. G. Warner, and W. Jackson. Box smoothing irons.—R. S. Newall. Condensing muriatic acid gas and other fumes.—I. Tipping. Lift pumps for mines and sewage and other works.

On June 16th.—2079 to 2095.—P. Curie. Anthracene.—E. Outram. Steam boilers and furnaces.—W. Jackson. Sewing or stitching machines for sewing the soles of boots and shoes.—R. Grime. Weaving coloured quilts.—J. H. Johnson. Preservation of hops.—J. H. Johnson. Bearing or suspension springs for furniture, vehicles, and other like purposes (com.)—T. Sturgeon and W. G. White. Rock drills, parts of which are applicable to steam engines and other purposes.—A. Bennett. Portable rotatory or fan blowers and fumigators and manufacture of the same.—F. de M. Turner. Permanent way of railways (partly com.)—C. A. McEvoy. Torpedoes.—W. Hawkings. Ladders and fire-escapes.—G. Montefiore. Railway and other tickets.—W. Dodshon. Railway rolling stock for neutralizing the injurious effects of collisions on railways.—J. P. Fison. Thrashing and other agricultural machines.—J. I. Fisher. Dry closets. W. Johnson. Manufacturing cast steel razors, edge tools, sheep shears, and other articles (requiring a superior cast steel) direct from the steel or metal made by the Bessemer or Martin-Siemens' process.—S. Remington. Construction of and method of repairing wood pavements.

On June 17th.—2096 to 2115.—J. Cook. Automatic couplings for railway trucks.—T. S. Hunter. Constructing docks and quay walls, foundations, bridges, subways, sewers, and other analogous works.—G. Edwards. Means of connecting the brakes throughout a railway train, such connections being available as safety couplings.—G. F. Simonds and J. A. Ferson. Process for tempering and forming articles of steel or steel and iron, and apparatus connected therewith.—J. H. Johnson. Cooking, lighting, and heating by means of liquid fuel (com.) (Complete specification.)—J. Pattison. Sleigh for carrying or collecting grass, hay, and grain crops.—J. M. Fairlie. Treating fruit or vegetable juices in order to preserve the same from fermentation and decay.—T. Rafferty. Apparatus used in connecting service pipes, cocks, and plugs to main gas pipes.—J. B. Whiting. Hot-air stove for warming and ventilating.—W. Smith and J. Whittaker. Permanent way of railways.—H. Conybeare and G. Naphegyi., Treating the juice of a certain tree in order to prepare or adapt it for useful purposes, and producing materials and useful and ornamental articles therefrom.—J. Colborne. Sewing machines, and the mode of actuating the same.—G. Haseltine. Sewing machines (com.) (Complete specification.)—A. Diss. Wheels for common road vehicles.—A. C. Henderson. Hook attachments to bands of fire-arms to facilitate the stacking thereof (com.) (Complete specification.)—W. W. Pilkington. Pipes for conveying or condensing acid gases in chemical operations.—C. E. Bainbridge and W. Pinkney. Furnaces, fire-places, and stoves.—H. Tasker and H. Shackler. Threshing machines and the apparatus connected therewith.—A. Holland. Shearing and clipping apparatus.—C. P. N. Weatherby. Process and apparatus for manufacturing ice, cooling buildings, and other cooling or refrigerating purposes.

On June 18th.—2116 to 2128.—W. Houghton. Machinery for cleaning grain.—E. P. H. Vaughan, F.C.S. Fountain penholder (com.)—J. Lord. Machinery for straightening, measuring, and cutting wire or rods of metal.—W. Barr. Apparatus for engaging, raising, retaining, lowering, and disengaging ships' boats.—J. L. Clark. Apparatus for actuating railway brakes.—R. Carter and J. Ashwin. Fastening for solitaires, sleeve links, studs, and other articles of jewellery.—J. H. Johnson. Patterns for draughting or cutting out articles of wearing apparel, and a new appliance for facilitating the fastening such patterns together (com.)—J. Wood. Spring hinge.—W. E. Gedge. Preparation and apparatus for testing alcohols and ascertaining the quantity of foreign bodies mixed therewith (com.)—W. E. Gedge. Doors of the carriages known as "landaus" (com.)—T. Pearson. Vehicles for the distribution of liquids and appliances connected therewith.—G. A. Henty. Trap for cisterns.—P. Brannon. Combination and mode of employing concreted and cemented materials in union with other substances in the construction of building, engineering, and other works. (Complete specification.)

On June 19th.—2129 to 2140.—T. W. Miller. Brakes for railway carriages.—G. F. Hammond and D. Morgan. Packing for steam-boilers, engines, and other similar purposes.—A. Barlow. Machinery or apparatus for type-writing, or composing and printing words, letters, figures, and marks upon paper or other material by means of type or printing surfaces in lieu of pens or pencils.—A. Macklin. Ventilating apparatus applicable generally, but particularly adapted for the ventilation of railway and other carriages.—A. J. Williams. Revolving shutters, and other articles having to be raised and lowered. —T. Ollis. Apparatus for marking or scoring at billiards, bagatelle, and similar games, and for registering the number of games played.—E. Hawker. Manufacture of jujubes and other articles of confectionery.—H. D. Muirhead. Means of transporting passengers and merchandize across straits, rivers, and arms of the sea or channels.—E. J. Hollings. Seed drills (partly com.)—W. R. Lake. Machinery for making nets for fishing and for other purposes (com.)—J. H Small. Fastener or binder for tickets, cards, and other like articles, chiefly designed for the conductors of tramway carriages and omnibuses.—A. Browne. Machinef or cutting paper and other materials (com.)

On June 20th.—2141 to 2155.—J. Coultas and J. P. Coultas. Corn, seed, and manure drills.—C. Kingsford. Manufacture and treatment of artificial fuels.—J. Lang, T. Westly, and W. Bibby. Weaving shuttle.—L. Duport. Hot-air stove with duplex pipes.—T. Robinson. Manufacture of sulphates of soda and potassa, and in apparatus employed therein.—N. Robinson. Looms for weaving.—G. Hodgson and J. Broadley. Apparatus employed in weaving.—J. Smith. Mechanical stoking apparatus for boiler and other furnaces.—W. R. Lake. Cataplasm or process (com.)—F. Moore. Machinery for drying and bumbling wool.—J. N. Mappin. Portable bottle-holder.—W. Beckwith. Machinery for hoeing turnips and other crops.—N. Stanford. Rolling mills or machinery for rolling iron and steel wire or other light sections of rolled iron or steel.—W. Matthews. Apparatus for lifting and lowering blocks of stone or concrete or other building blocks, and for disengaging such blocks from the lifting apparatus. W. L. Wise. Apparatus for feeding steam-boilers and for forcing water therefrom (com.)

On June 22nd.—2156 to 2172.—C. P. Hollis. Propellers for bathers, to which is given the name of "velocifin."—J. Colverd. Carriage pole. —J. Bauer. Coupling for railway carriages and other rolling stock.—J. Partridge. Mechanism or apparatus to be used in conjunction with steam boilers either as a low-water alarm or as an automatic water-feeder.—B. Hunt. Processes for the preservation of articles of food (com.)—W. A. Sanderson, R. Sanderson,

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Scientific and Literary Review,
A RECORD OF PROGRESS IN
ARTS, INDUSTRY, AND MANUFACTURES,
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OCTOBER 1, 1874.

ON PROFESSOR TYNDALL'S ADDRESS.

Science and theology have been no very good friends for many years past, and we fear that a better understanding will not be promoted by Professor Tyndall's presidential address to the British Association. Indeed, the Professor's utterances on that occasion, although captivating in style, and evidencing great philosophical and scientific research, as might be expected from so eminent a *savan*, yet refer to little else than the arguments which have, and can be, adduced against the notion that the God of the material universe has any real existence, the Creator being dethroned by the fortuitous concourse of atoms—Evolution and Development becoming the Alpha and Omega, according to his neo-ancient philosophy.

As, unlike Professor Tyndall, we do not regard the sphere of science to encompass theological questions, we shall not enter into a criticism of his address in regard to its theological aspect, but shall deal with it as a disquisition of scientific philosophy, and we may at once state, that as such, we hold it to be worthy of no high place amongst scientific notabilia; for, assuming his views to be true, they must be met at once by the charge of being merely equivalent to shuffling the cards—substituting one wonderment and bewilderment for another—since, if it be unsatisfactory to the human mind that a Supreme Being should exist as the creator and arbiter of the material universe, who made everything out of nothing, and sustains everything by his mere fiat, it is an equally unsatisfactory wonder that matter should create itself, and that the ultimate atoms should have automatic existence, with full power of evolving and developing more and more complex forms by their own innate force and adaptability to the progression of natural events in every age and every clime.

Moreover, such a theory of the universe is by no means proved by a sufficiency of established facts; for, even let it be acknowledged that evolution and development may have played an important part in bringing about the present order of things—which, by the way, is by no means proved—yet it does not follow that a supreme directing and interacting intelligence has not been operating to keep everything properly at work in order to accomplish plans and designs which were within the scope of the great Creator's plan; for it may well be that the elements of the forms that now exist were launched into existence with sufficient capabilities for the development of other and modified forms, and yet, like the kaledioscope, they might require to be properly acted upon every time old figures were to disappear and new ones to replace them.

The attempt to ascertain with certainty the how and why the world of to-day came into existence and assumed its present form, appears to be as vain as the attempt to discover the perpetual motion; for, suppose we trace it back to an ultimate atom, yet can we not explain how that atom came to exist, and why it evolved and developed the varied forms and structures we see around us? Hence, if the mission of science be to carry on such an unpromising enquiry, it will be even more useless than the old scholastic theology, and must end in doing more mischief than any possible kind of mental exercitation.

If it be simply loss of life when we die, why all this brain toil? why these perpetual strivings to attain the *summum bonum*? Let us eat, drink, and be merry, for to-morrow we die. It is clear, according to the Professor's arguments, we are individually to end all in the tomb.

But above all, we object to the Professor's address as being out of place and unfair. It is out of place because, although a few big-named men have thought proper to roundly assert in regard to several branches of science, that certain facts ascertained by the investigations of themselves and others, conclusively prove (when they only appear to intimate) an antagonism to exist between the facts of nature and the teachings of religion; yet it is generally considered that the arena of science does not admit of theological combats, and so well is this recognised that the British Association for the Advancement of Science has no Theological Section, and does not discuss theological questions; hence it was unfair in Professor Tyndall to descant as he did upon his view of the theological deductions to be drawn from scientific investigations. How unfair this was is proved by the fact that a paper by an eminent divine (Professor Watts), in answer to Professor Tyndall, was not allowed to be read at the meeting of the Association.

Dr. Tyndall's remarks to the effect that religion is a pleasant sentimentality to which the human mind is generally addicted, and that it has its uses, is, according to our notion, merely a sop to Cerberus; and it is brought in so abruptly—indeed, to use the vernacular, so rudely "lugged in,"—that its effect as a sop is *nil.*

It is matter for great regret to all who wish to see science progress and become popular, that the Professor should have given utterance to his peculiar views in a presidential address, because, having a sort of corporate aspect, it will make religious men look askance at science; or if they do look upon her they will only do so when they suppose they can keep her in leading strings, a system we hold to be as pernicious as would be the cultivation of science as an antithesis of received theology

Moreover, as advocates of mental freedom, we regret this address, for it shows that scientific chiefs are as likely to use the "*sic volo sic jubeo*" as the most virulent of Arch priests.

Since the address was delivered it has been printed and published by the Professor, with additions and preface,* but we cannot see that he has mended the matter by this, for all we can make out is that he asserts that his theory is not inconsistent with religious ideas; though they are not such ideas as are entertained by the world at large. The best thing that could be done with this unfortunate address would be to let it quietly become a nine days' wonder, for it contains little that either in the way of retrospective remark or prospective suggestion will be likely to aid scientific workers in carrying out any practically useful work, being herein deficient in those qualities usually and properly looked for in opening addresses; which should not be essays on the opinions of the speaker on some transcendentally important question (as he deems it), but should contain thoughts on the past and on the future that may serve us in our progress onward.

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* Longmans, Green, and Co., London.

BRITISH ASSOCIATION.

(Continued from our last.)

AUGUST 21ST TO END OF MEETING.

SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

Professor G. C. Foster, F.R.S., read a paper on the "Suggestions for a Re-determination of the Absolute Electro-magnetic Units of Resistance and Electro-Motive Force." This paper was criticized by Professor Guthrie, Professor Clerk Maxwell, Professor Wiedemann, Professor Everett, and the President.

The President called on Mr. W. Symons to read his paper, but as that gentleman was absent, one of the secretaries read three short papers by Mr. Symons on the following subjects:—"A New Method of Constructing Carbon Cells and Plates for Galvanic Batteries," "Notes on a New Method for the Electro-Chemical Decomposition of Oils and other Non-conducting Liquids," "A Cheap and Convenient Galvanic Battery Adapted for Weak but Continuous Currents."

Papers were read by Mr. Dewar, on the "Latent Heat of Liquified Gases; by Mr W. Ladd, on the "Construction of large Nicol's Prisms; on the "Flight of Birds," by Professor F. Guthrie. A paper descriptive of a trompe or blowing engine giving a supply of coal or other gas under pressure, by Mr. F. H. Marshall, was read by one of the secretaries; also a paper on the "Source from which the Kinetic Energy is Drawn which Passes into Heat in the Tides," by Professor Purser.

A paper "On the Apparent Connection between Sun Spots and Atmospheric Ozone" was then read. The results in this paper were deduced from the observations of nineteen years, and it appears that the maximum of ozone occurs with the maximum of sun spots, and the minimum of ozone with the minimum of ozone sun spots. Dr. Moffat expressed a hope that others would be induced to take observations.

Professor G. C. Foster, F.R.S., read a paper describing a new method of making absolute measurements of electrical resistance. A measurement of this kind was made by a committee of the British Association some years ago, and the result is pree served in the shape of a standard coil. Morrecently, Professors Kohlrausch, of Darmstadt, and Lorenz, of Copenhagen, have made similar determinations, which differ in opposite directions from the determination of the British Association committee, each to the extent of about two per cent. It is, therefore, clearly desirable that fresh experiments should be made, and the object of Professor Foster's communication was to suggest a method by which he believed that some of the chief difficulties in previous experiments might be avoided. In this method there is a revolving coil of wire, whose extremities are connected through a commutator with two points in the circuit of a galvanic battery, and the adjustments are to be such that no current passes in the coil. Irregularities of resistance at the places of contact with the commutator will then have no injurious effect.

Prof. Everett read a paper in which he showed that there is a rigorous analogy between the moment of a force round a point, and the velocity of a particle due to rotation round an axis; the line of action of the force being supposed identical with the axis of the rotation, and the magnitude of the force being supposed numerically equal to the velocity of the rotation. Hence it is easy to deduce the known proposition that any number of angular velocities round any axes whatever, can be compounded by the same laws as forces acting along these axes. In the case of couples and translations an axis must be supposed at an infinite distance. By an adaptation of quarternions he conferred greatly increased facility upon the treatment of questions relating either to the velocity of a rigid body, or to a system of forces acting on a rigid body. Every symbol in the equations could be interpreted both ways; and the same symbol which denoted the velocity of a point in the one interpretation denoted in the other interpretation the moment round this point. The *Messenger of Mathematics* is publishing this method in full.

Prof. Clifford exhibited a jointed frame in illustration of some beautiful discoveries recently made as regards what machinists call parallel motion. It was thought until recently that to produce a rigorously straight movement by a combination of jointed rods was impossible; but Peaucellier solved the problem about a year ago; and, quite recently, Mr. Hart and Prof. Sylvester have attained the same end with a smaller number of rods. They have also adopted their solution to the construction of an instrument for drawing conio-sections.

The Reports on Underground Temperature, British Rainfall, and Meteors did not present much novelty. Mr. Negretti exhibited his new thermometer for indicating the temperature at the bottom of the sea. When the temperature at the bottom of the sea is intermediate between temperatures at smaller depths, no previously invented instrument was capable of recording it. This thermometer remains upright so long as the instrument is descending or stationary; but hauling up causes it to turn over, and in so doing to detach a column of mercury which serves as the index. The frame which carries the thermometer carries also a broad-bladed screw with vertical axis. Revolution being in one direction when descending, and in the other when ascending, by the reaction of the water, which in the upward motion is the cause of the overturning of the thermometer. A thermometer of the same kind was exhibited, mounted on an alarum clock, which turns it over at the hour to which the alarum is set.

Prof. W. F. Barrett in presenting the report of the committee on the molecular chang es accompanying magnetisation, detailed a number of experiments which had been made by himself and Professor Guthrie. As a result of these experiments it had been found just before an iron wire passed to a red heat a momentary contraction occurred, and after the expansion proceeded regularly. Other changes accompanied it. If the wire was first raised to a white heat, and then cooled to a dull red heat, a momentary elongation occurred. If in the dark at this moment the wire became invisible and ceased to glow, although the sources of heat continued unchanged, it then glowed again with a bright red heat. The same phenomenon was observed in nitrogen and carbonic acid. This elongation or contraction was more marked the greater the tension of the wire. A very audible click, such as would be emitted by an iron bar when magnetised, was emitted by the wire. These phenomena were more sharply marked when steel wire was used. Pianoforte wire answered well for the experiment. These experiments had last winter been shown to Professor Tait, who repeated to him (Professor Barrett) some experiments he had made on the thermoelectric properties of iron, and it was found that the temperature at which the transition remarked by him took place was the same as that at which the phenomena referred to occurred.

In answer to Professor Everett,

Professor Barrett stated that when the wire had been heated, and was allowed to cool in the air, it first cooled regularly, then suddenly increased in temperature and luminosity, and then afterwards continued to cool.

Professor Wiedemann, of Leipzig, enumerated several experiments on the magnetic properties of chemical compounds. He commenced by referring to former experiments, which had given the following results:—(1) That the magnetism of a molecule of the equally constituted salts is the same; (2) that the molecular magnetism of the salts of peroxide of iron is greater than that of the salts of protoxide of iron; (3) that the magnetism of collodially dissolved peroxide of iron is only one-fifth of that of the peroxide combined with acids. Acting upon these results he by recent researches proceeded to determine the division of peroxide of iron between water and acids, or the dissociation of iron and salts by water. He found that by adding one moler of sulphuric acid to one moler of peroxide of iron only 75 per cent. of one molecule of sulphate of iron was formed, 25 per cent. of the molecule of the acid and of the peroxide remaining free in the solution. By adding more acid the quantity of free oxide was gradually diminished. By dividing the quantity of sulphate of iron formed by the quantity of acid employed, one obtains the quantity of salt formed for each molecule of acid. This quantity is nearly at its maximum when the rate of the molecular quantities of peroxide and acid is 1: 1. Similar results were obtained with other acids. Adding two acids to peroxide of iron in the same way the division of the peroxide between these acids and the water might be determined.

Some discussion followed, and a vote of thanks was heartily accorded. A communication in German was then made to the section by Dr. Feddersen upon "Some peculiarities in the electric discharge from a Leyden jar." Professor Clerk Maxwell followed with the exposition of "A solution of a problem in statics by Kirchoff's equations of electric currents." The following papers bearing much upon the same subject were then read by Mr. Glaisher. "Report of committee on mathematical tables," by Mr. J. W. L. Glaisher; "Contributions to the report on mathematical tables," by Professor Bierens de Haan; "On the calculation of exponential functions," by Professor F. W. Newman.

Professor Everett read a paper on statical and kinematical analogues, in which it was shown that the movement of a force round a point is analagous to the velocity of a particle due to rotation round the line of action of the force. By supposing this line to be indefinitely distant, we obtain the proposition that a couple is analagous to a velocity of translation. In a second paper, Professor Everett gave a short quaternion formula, representing an operation to be performed on the vector of an arbitrary point. This operation is called a motor, and represents either any set of forces acting on a rigid body, or any velocity of a rigid body. A full account of the method is given in the Messenger of Mathematics for the present year.

The Report of the Committee "On the Teaching of Physics in Schools" was read by Prof. Foster.

In the Sub-Section, Dr. Carpenter made a communication "On the Physical Theory of Under-currents," in which one of the chief novelties was a sectional map of the sea between Nova Scotia and Bermuda, showing isothermal lines. These lines were tilted up at the western end, indicating the existence of a cold current between the American coast and the Gulf Stream. The tilting up at the western end was interpreted by Dr. Carpenter as due to the rotation of the earth, combined with the circumstance that this cold water is flowing from north to south. A similar phenomenon is met with on the east coast of Japan, where there is a cold band between the Japan current and the land; and also in the North Sea, where there is glacial water within 100 miles of the north coast of Scotland. On the Dogger Bank there is a difference of 15° Fahr. in five fathoms. Dr. Gwyn Jefferies, when he mentioned this to him, replied, "That explains why I dredged Arctic shells on the Dogger Bank."

A report was given in from Mr. Meldrum, confirming, by further investigation, his previous generalization, that the cyclones of the Mauritius are most numerous and severe in the years when sun-spots are at a minimum.

Prof. Herschel exhibited an apparatus which he had been employing, in conjunction with Mr. G. A. Lebour, for experiments on the thermal conductivity of different kinds of rock. Their results, so far, were in close agreement with those of Péclet.

Prof. Everett read the concluding Report of the Committee for "The Selection and Nomenclature of Units." It stated that some members of the Committee were engaged in preparing for publication a popular exposition of the whole subject of physical units.

Section B.—CHEMICAL SCIENCE.

Professor Brown presided.

Professor Corfield read the report of the committee "On Utilization of Sewage."

Dr. Hodges read a paper "On the Petrified Wood of Lough Neagh," which was supposed to be produced by the ferruginous properties of the water. But the analyses showed, it was stated, that the water of Lough Neagh in our time at least possesses no peculiar qualities, and that the lapidifying material of the petrified wood is silicic acid, and not oxide of iron. The examinations of the specimens also show that the hardening is not produced merely by superficial incrustation of the lapidifying silicic acid, but that it has penetrated through almost every portion of the vegetable structure.

Professor Roscoe submitted a very interesting description of an apparatus which has been constructed, by which the tint produced by the exposure of a certain prepared sensitive paper to the sun can be measured on a self-registering principle, and whereby can be ascertained with a great degree of accuracy the relative amount of chemical action falling upon the earth's surface from the sun, and the variations which take place from hour to hour, and day to day, and season to season, in that action.

Professor Roscoe delivered an address "On Abnormal Chlorides.'

Professor Thorpe delivered an address "On the Specific Volumes of Certain Liquids."

Mr. Braham read a paper prepared by Mr. Gatehouse and himself "On the Dissociation of Nitric Acid."

Dr. Carpenter delivered an address, the principal object of which was to ascertain the views of the section on the replacement of soft organic structures of foraminifera and sea urchins by silica. He stated that this process frequently occurred, and it must be caused by some chemical process. It had been suggested to him that the formation of ammonia by decaying organic matter might explain it.

Dr. Macloskie stated that the question raised by Dr. Carpenter was very important, as it cast some light on the question of the petrified wood of Lough Neagh.

After considerable discussion,

A Member mentioned that silica had a power of penetrating the interstices of organic substances, and, as to the further process of taking the place of the organic matter which the latter decayed, the formation of ammonia might probably be the cause. He would, however, like to make further experiments in the matter before giving a decided opinion on the point.

Dr. Andrews, of Belfast, read a paper describing the precautions which he had adopted in conducting his experiments under very great pressures.

Dr. Debus read a paper referring to spontaneous generation when regarded from the chemical aspect. It had been asked, was it possible that lower forms of life could be produced as the mere spontaneous work of inorganic material? Darwin, as is well known, had propounded a view that animals underwent changes when the external conditions under which they lived became changed. Abroad some of his followers had strained the Darwinian theory till it was made to include the idea that from inorganic matter organic life could be developed. Dr. Debus, however, announced to the Chemical Section that the result of the experiments of chemistry was that there were no conditions favourable to the formation of organized matter from inorganic material, that, on the contrary, life is destroyed when the temperature is raised beyond a certain point, while chemistry further shows that in former times no conditions existed which would enable "organic life" to be formed from inorganic matter. There was no discussion on this paper.

A new filter pump, of improved form, by using which the time of filtration was reduced to one sixth, was explained by Mr. W. J. Lovett. It was not stated what advantages it possesses over the excellent apparatus designed by Bunsen, with which it appears to have a good deal in common.

Dr. Andrews called attention to the composition of an inflammable gas which issues from below the silt bed in Belfast.

A Report on an elaborate examination of specimens of tea from Cachar was read by Prof. Hodges. An indigenous sample from the variety of the plant, which was originally growing wild in the jungle, was pronounced to be the true *Thea viridis*. The other sample is from what is supposed to be the true hybrid between the indigenous and Chinese varieties, and partakes very much of the peculiarities of both varieties. The China plant is believed to be the true *Thea bohea*, and is a small, stunted plant compared with the indigenous. The hybrid gives a good strong infusion, and is a much hardier plant than the indigenous. Each kind gave about 5 per cent. of ash, which contains, in 100 parts:—

	Indigenous.	Hybrid.
Potash	35·200	37·010
Soda	4·328	14·435
Lime	8.986	5·533
Phosphoric acid....	18·030	9·180

The proceedings of this Section were brought to a conclusion by the reading of a paper by the President, "On the Mode of Writing Chemical Equations."

Mr. L. C. Miall submitted the concluding Report on the Labyrinthodonta group.

The Report "On the Sub-Wealden Exploration", by H. Willett and W. Topley, dealt with the progress made since the Bradford meeting.

Dr. Carpenter again brought up the Eozoon controversy. Prof. Harkness felt disposed to combat Dr. Carpenter's arguments, referring especially to the fact that Eozoon occurs in the metamorphic rocks which yield no other trace of life. Prof. T. R. Jones, however, mentioned that Dr. Dawson had discovered worm-tubes in rock containing Eozoon, and he was still disposed to regard this curious structure as of animal origin, a view which was also supported by Prof. Hull.

Mr. Hardman read a paper "On Lough Neagh." He regards the lake as having been marked out by faults, but mainly produced by a synclinal arrangement of the strata. Denudation has had some small effect in removing the rocks displaced by the faults; but he thinks that ice has had comparatively little to do with the formation of the lake, notwithstanding the fact that its direction agrees generally with that of the great ice-sheet which has glaciated the district. The most important point is that the clays which occur at the southern end of the lake underlie the boulder clay and overlie the basalt, and that these clays are distinctly of Pliocene age. These are later than the lake-depression, consequently the lake-basin cannot be of glacial age.

Prof. Herschel and Mr. Lebour have continued their researches upon the "Conductivity for Heat of Certain Rocks." The results at present attained show that granite is the best conductor, coal the worst; if a series be made, taking granite as 1 and coal as 10, it will be found that the greater number of rocks range themselves under 2 or 3; shale is about 9, while most of the intermediate places are as yet unfilled.

Prof. Hull gave an account of the progress of the Geological Survey of Ireland, of which he is the director.

The Classification and Range of the Drift-Beds formed the subject of a paper by Mr. Hardman.

Mr. Crosskey's Report on the Boulders of England and Wales gave an account of the progress of the work during the past year.

Excursions were made by this Section to places of interest in the neighbourhood.

Section C.—GEOLOGY.

The President, Professor Hull, M.A., F.R S., F.G.S., presided.

Sir Willoughby Jones, F.R.G.S., read a paper "On Cavern Explorations in the Pyrenees," by M. Frossard.

Mr. W. C. Roberts, F.G.S., read a paper "On the Columnar Form of Basalt."

Mr. R. H. Tiddeman, F.G S. (in the absence of the author, Mr. W. H. Bailey, F.G.S.), read the paper "The Coal Measure Fossils of Ireland," which had been communicated on this subject.

Mr. E. H. Kinahan, F.E.S., read a paper "On Geological Maps and Sections of West Galway and South-West Mayo."

This section resumed its sittings on Saturday morning at 11 o'clock, Professor Harkness, F.R.S., F.G.S. (in the absence of the President, Professor Hull, M.A., F.R.S., F.G.S), presiding.

Professor Harkness stated that the first paper to be read that morning was the third report of the committee for collecting fossils from localities difficult of access in North-Western Scotland.

Mr. R. Russell, C.E., F.G.S., the author of a paper "On the Permian Breccias of the Country near Whitehaven," not being in attendance, it was read by Mr. Miall.

Professor Harkness said that on the previous day Mr. Tiddeman read the report of the committee assisting in the exploration of the Settle Cave (Victoria Cave), in the course of which he alluded to a human fabula found in that cave by Professor Busk, and which was believed to belong to the most remote antiquity.

Section D.—ZOOLOGY AND BOTANY.

Dr. Hooker delivered his address in the room of the Department of Anatomy and Physiology, which was crowded to excess, and numbers were unable to gain admission.

The President (Dr. Hooker) said:—I have chosen for the subject of my address to you from the chair in which the Council of the British Association has done me the honour of placing me, the carnivorous habits of some of our brother organisms—Plants. Various observers have described with more or less accuracy the habits of such vegetable sportsmen as the Sun-dew, the Venus' Fly-trap, and the Pitcher plants, but few have inquired into their motives; and the views of those who have most accurately appreciated these have not met with that general acceptance which they deserved. Quite recently the subject has acquired a new interest, from the researches of Mr. Darwin into the phenomena which accompany the placing albuminous substances on the leaves of Drosera and Pinguicula, and which, in the opinion of a very eminent physiologist, prove in the case of Dionæa, this plant digests exactly the same substance, and in exactly the same way, that the human stomach does. With these researches Mr. Darwin is still actively engaged, and it has been with the view of rendering him such aid as my position and opportunities at Kew afforded me, that I have, under his instructions, examined some other carnivorous plants. In the course of my inquiries I have been led to look into the early history of the whole subject, which I find to be so little known and so interesting that I have thought that a sketch of it, up to the date of Mr. Darwin's investigation, might prove acceptable to the members of this Association. About 1768 Ellis, a well-known English naturalist, sent to Linnæus a drawing of a plant, to which he gave the poetical name of Dionæa. I will read the account which he gave of it to Linnæus, and which moved the great naturalist to declare that, though he had seen and examined no small number of plants, he had never met with so wonderful a phenomenon:—"This plant shows that Nature may have some views towards its nourishment, in forming the upper joint of its leaf like a machine to catch food; upon the middle of this lies the bait for the unhappy insect that becomes its prey. Many minute red glands that cover its surface, and which perhaps discharge sweet liquor, tempt the poor animal to taste them; and the instant these tender parts are irritated by its feet, the two lobes rise up, grasp it fast, lock the rows of spines together, and squeeze it to death. And further, lest the strong efforts for life in the creature just taken should serve to disengage it, three small erect spines are fixed near the middle of each lobe, among the glands, that effectually put an end to all its struggles. Nor do the lobes ever open again, while the dead animal continues there. But it is, nevertheless, certain that the plant cannot distinguish an animal from a vegetable or mineral substance; for if we introduce a straw or pin between the lobes, it will grasp it full as fast as if it was an insect." Linnæus, however, only saw in these wonderful actions extreme sensitiveness in the leaves, and did not accept Ellis's account of the *coup de grâce* which the insects received from the three stiff hairs in the centre of each lobe of the leaf. For about a century the history of the plant was very little advanced. Sixty years after Linnæus wrote, Dr Curtis, of Wilmington, North Carolina, published accurate scientific observations. For another generation the history of this plant stood still; but in 1868 an American botanist, Mr. Cianby, while staying in the *Dionœa* district, studied the habits of the plant pretty carefully, especially the points which Dr. Curtis had made out. His first idea was that "the leaf had the power of dissolving animal matter, which was then allowed to flow along the somewhat trough-like petiole to the root, thus furnishing the plant with highly nitrogenous food." By feeding the leaves with small pieces of beef, he found, however, that these were completely dissolved and absorbed; the leaf opening again with a dry surface, and ready for another meal, though with an appetite somewhat jaded. He found that cheese disagreed horribly with the leaves, turning them black, and finally killing them. Dr. Hooker then described the character of the communication on this plant made at last meeting of the Association by Dr. Burdon Sanderson. All students of the vegetable side of organised nature were astonished to hear that certain experiments which Dr. Sanderson, at the instigation of Mr. Darwin, had made, proved to demonstration that when a leaf of *Dionœa* contracts, the effects produced are precisely similar to those which occur when muscle contracts. Not merely are the phenomena of digestion in this wonderful plant like those of animals; but the phenomena of contractility agree with those of animals also. The President proceeded to trace at much length the interesting history of the Sun-dew of the genus *Drosera*. Another illustration taken by Dr. Hooker was the very curious group of Pitcher-plants which is peculiar to the New World. The genus *Saraceni* consists of eight species, all similar in habit, and all natives of the Eastern States of North America, where they are found more especially in bogs, and even in places covered with shallow water. Their leaves, which give them a character entirely their own, are pitcher-shaped and trumpet-like, and are collected in tufts springing immediately from the ground; and they send up at the flowering season one or more slender stems, bearing each a solitary flower. This has a singular aspect, due to a great extent to the umbrella-like expansion in which the style terminates; the shape of this, or perhaps of the whole flower, caused the first English settlers to give to the plant the name of side-saddle flower. The first fact which was observed about the pitchers was that when they grew they contained water. The description of the various species, and their history, given by Dr. Hooker, was long and exhaustive. In 1829, Burnett wrote a paper containing a good many original ideas, expressed in a somewhat quaint fashion, in which he very strongly insisted on the existence of a true digestive process in the case of *Sarracenia*, analogous to that which takes place in the stomach of an animal. Our knowledge of the power of *Sarracenia variotaris* is now pretty complete, owing to the observations of two South Carolina physicians. One, Dr. M'Bride, made his observations half a century ago, but they had, till quite recently, completely fallen into oblivion. He devoted himself to the task of ascertaining why it was that *Sarracenia variotaris* was visited by flies, and how it was that it captured them. Dr. Mellichamp, who is now resident in the district in which Dr. M'Bride made his observations, has added a good many particulars to our knowledge. It is evident that there are two very different types of pitcher in *Sarracenia*, and an examination of the species shows that there may probably be three. These may be primarily classified into those with the mouth open and lid erect, and which consequently receive the rain water in more or less abundance; and those with the mouth closed by the lid, into which rain can hardly, if at all, find ingress There is obviously much still to be learned with regard to *Sarracenia*, and I hope that American botanists will apply themselves to this task. I cannot take leave of *Sarracenia* without a short notice of its near ally, *Darlingtonia*, a still more wonderful plant, an outlier of *Sarracenia* in geographical distribution, being found at an elevation of 5,000 feet on the Sierra Nevada of California, far west of any locality inhabited by *Sarracenia*. It has pitchers of two forms; one, peculiar to the infant state of the plant, consists of narrow, somewhat twisted, trumpet-shaped tubes, with very oblique open mouths, the dorsal lip of which is drawn out into a long, slender arching, scarlet hood, that hardly closes the mouth. At first sight the perplexity is not diminished by considering the nature of ordinary vegetable nutrition. The roots take up certain matters from the soil. Nitrogen forms nearly four-fifths of the air we breathe, yet plants can possess themselves of none of it in the free, uncombined state. They withdraw, in minute quantities from the ground, nitrates and salts of ammonia, and from these they build up with starch, or some analagous material, albuminoids or protein compounds, necessary for the sustentation and growth of protoplasm. At first sight nothing can be more unlike this than a *Dionœa Nepenthes* capturing insects, pouring out a digestive fluid upon them, and absorbing the albuminoids of the animal, in a form probably directly capable of appropriation for their own nutrition. Yet there is something not altogether wanting in analogy in the case of the most regularly constituted plants. The seed of the castor oil plant contains, besides the embryo seedling, a mass of cellular tissue or endosperm filled with highly nutritive substances. The seeding lies between masses of these and is in contact with it—and as the warmth and moisture of germination set up changes which bring about the liquefaction of the contents of the endosperm, and the embryo absorbs them, grows in so doing, and at last having taken up all it can from the exhausted endosperm, developes chlorophyll in its cotyledons under the influence of light and relies on its own resources. A large number of plants, then in their young condition, borrow their nutritive compounds ready prepared, and this is in effect what carnivorous plants do later in life.

Professor Huxley, in an interesting and amusing speech, moved a vote of thanks to Dr. Hooker for the very remarkable and suggestive address which he had just delivered. Dr. Bentham seconded the motion. Professor Redfern, in conveying the vote to Dr. Hooker, amid loud applause, said that, as the doctor must have seen, there was not the least appearance of a single tired face throughout the whole of his lengthened and exhaustive address. (Applause.) Dr. Hooker briefly acknowledged the vote, and the audience separated. The department of Zoology and Botany assembled in their own room; Dr. Hooker in the chair.

Dr. Carpenter delivered an address "On Further Researches on Eozoon Canadense." In the course of a lengthened address he contended that the hypothesis of the foraminiferal origin of Eozoon canadense entirely accorded with the features alike of the general and of the minute structure of the best preserved specimens of this body, and that it is the only hypothesis which fits all the facts of the case; whilst the hypothesis of subsequent metamorphic change, which has every probability to recommend it, fully accounts for all the appearances on which the anti-Eozoonists rely as evidence of its mineral origin, which, in the face of the new evidence he adduced, was to his mind utterly "unthinkable." Dr. Jeffreys, Professor Macalister, and Dr. Wright spoke in support of Dr. Carpenter's views. The President thought they must all congratulate Dr. Carpenter on that matter. He had brought this disputed organism to the most severe test to which a man could bring it. The opinion of Dr. Macalister in the matter was most valuable, for he had considered the question both as a mineralogist and as a biologist.

Dr. Macalister (Dublin) read a paper on the structure of a specimen of *Selache maximus*, the great basking shark of the west of Ireland. The specimen was 25 feet long, and from its liver 90 imperial gallons of oil were extracted. This shark is quite devoid of ferocity, feeds on small crustacea, and has between his gill arches long, whalebone-like teeth of true dentine, which act as strainers, and prevent the food (taken in at the mouth with the water for breathing purposes) from escaping through the gill-slits. Its teeth, as might be imagined, are very small and conical.

Professor Cunningham and Dr. Wright having spoken briefly on the matter,

Professor Cunningham read a "Report of the Committee on the Influence of Forests on Rain," the committee consisting of Professor Balfour, convener; Dr. Cleghorn, Mr. Robert Huchison, Mr. Alexander Buchan, and Mr. John Sadler. After some discussion, the President said that the report did not properly come within the province of that section. Professor Balfour should take it into one of the physical sections, and there have it discussed.

A report was read from the Close Time Committee with reference to the desirability of establishing a close time for the preservation of indigenous animals.

Mr. E. R. Lankester read a paper on the genealogical import of the internal shell of mollusca, in the course of which he referred to what has been called the recapitulation hypothesis, according to which all living things in their development present a rapid series of pictures or dissolving views of their ancestors, arranged in historical order.

Prof. Dickson read a paper on the curious root-like processes developed in different species of tropæolum from the embryo. These processes, which are unknown in any other plants, penetrate beyond the tissues of the seed, and, no doubt, minister to the nutrition of the embryo by withdrawing nutrient matters from the tissues of the carpel

Mr. A. W. Bennett read a paper to a certain extent supplementing the lecture of Sir John Lubbock, hereinafter referred to. He discussed the form of pollen grains in relation to the fertilization of flowers. A single instance must suffice to give a notion of the character of the paper. The most common form of pollen prevails, but in the Kerguelen's Land cabbage (*Pringlea antiscorbutica*) the wind, from the nature of the climate, must do the work elsewhere done by insects; the flowers are, accordingly, inconspicuous, being destitute of petals, and the pollen is spherical. A rather lengthened discussion took place, in which Sir John Lubbock and others took part.

Mr. Archer read a paper "On the Spores of Scytonema," which, although extremely important in reference to modern theories of the nature of lichens, was only intelligible to botanists.

DEPARTMENT OF ANTHROPOLOGY.

This department assembled at the conclusion of Dr. Hooker's address; Sir W. R. Wilde presiding.

Mr. Frederick Drew, LL.D., F.G.S., read a paper "On the Distribution of the Races of Men inhabiting the Jummo and Kashmir Territory."

Mr. M. J. Walhouse contributed a paper, entitled, "On a Leaf-wearing Tribe on the West Coast of India." Sir Walter Elliott said that the practice of wearing leaves was by no means confined to this one tribe in India. On great festivals to Kali, the women, in fulfilment of vows, would walk in procession covered with leaves, and surrounded by their female friends. General Cotton expressed concurrence in this.

Papers were also contributed by Major Godwin Austen "On the Rude Stone Monuments of the Khasi Hill Tribe," and by Dr. Hyde Clarke "On the Agaw Race in Caucasia, Africa, and South America."

In the department of Anthropology Sir William Wilde delivered an address on "The Early Races of Mankind in Ireland, their Remains and Present Representations."

The Rev. Canon Hume read a paper on "The Origin and Characteristics of the People of Down and Antrim."

ANATOMY AND PHYSIOLOGY.

The department of anatomy and physiology met, after Dr. Hooker's address, under the presidency of Professor Redfern.

Mr. B. Waterhouse Hawkins, F.L.S., F.G.S., made some observations, with graphic illustrations, on a pair of symmetrical bones present with the fossil remains of iguanadon in the well-known slab from Maidstone, now in the British Museum.

Prof. M'Alister, of Dublin, gave an account of the tongue of the great ant-eater, and its muscular attachments—from recent dissections of his own—confirming the previous accounts of Owen and the unpublished recearches of Flower. Dr. Caton exhibited to the section a neat form of microscope, with no proper stage, but free space for the application of a hot plate and pincers of such a character as to enable the observer to bring living tissues of warm-blooded animals under study with the highest powers.

Prof. Huxley read a paper "On the Bone called the Columella in Reptiles and Amphibia." He stated that he had been going over some points in the development of the lower jaw and succeeding arches in the tadpole, and had been led to differ from his friend Mr. Parker on the derivation of the parts of these arches abutting upon the periotic capsule. Mr. Parker held that the most anterior cartilaginous arch represented the first and second arch of other vertebrates in a fused condition, but Prof. Huxley had been working over this matter with specimens, and found that such was not the case. This made an important difference in the interpretation to be given to neighbouring parts, which were fully explained and illustrated by drawings on the black board.

Mr. Ray Lankester brought under the notice of the section, his "Observations on the Mode of Development of the Eye in the Cuttle-Fish," recently made by him at Naples. He instituted a comparison between the eye of the verebrate and cephalopod, and showed how radically they differ in development. Yet he was inclined to believe that they might ultimately be traced to a common origin. In Loligo and Sepia, the eye originates as a raised elliptical wall on the surface of the embryo. The wall closes in above, and thus the primary optic vesicle is formed. From the front of this arise new wall-like growths, forming an interior or second optic vesicle, cornea, and iris. The lens, curiously enough, is secreted from the cells of the anterior wall of the primary optic vesicle, and is quite free from cell-structure. It is a cuticular-formation, such as the bristle of an annelid. Thecells of the posterior part of the primary optic vesicle become modified, so as to form the two layers of retinal elements. It is important to observe that in Nautilus there is, as Heusen described, no lens, and but one optic chamber.

The President of the Section, Prof. Redfern, gave some account of experiments in which animals had been made to respire pure oxygen and oxygen mixed with ozone. The former produced death after a time, the latter very rapidly; emphysema and great congestion marking the post-mortem appearances.

SECTION E.—GEOGRAPHICAL DEPARTMENT.

Major Wilson, President of the Section, occupied the chair.

Dr. Carpenter delivered an address "On the Results of the Challenger Researches into the Physical Conditions of the Deep Sea."

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

This section resumed business on Saturday in one of the rooms of the Methodist College—the Right Hon. Lord O'Hagan presiding.

Mr. Samuel Brown, F.S.S., read the report of the Metric Committee.

Mr. George Robert Crowe, read a paper on "The Compilation of Statistics, illustrated by the Irish Census."

SECTION G.—MECHANICAL SCIENCE.

This section resumed its sittings on Aug. 22; Professor James Thomson LL.D., F.R.S.E., presiding.

Mr. E. J. Harland, C.E., with the aid of models, gave a detailed description of a screw-lowering apparatus for ships, which he had lately invented.

A paper was read by Mr. G. N. Beynon "On Compensating Apparatus for Distant Signal Wires of Railways." Hitherto the old method of the screw connection or ratchet wheel has been employed as the only means of adjusting the wires of distant signals. At the commencement of this year, however, an apparatus was invented and patented by Mr. G. W. Benyon, of 19, Salisbury-street, Strand, London, which self-regulates and adjusts the wires of signals, and which combines extreme simplicity and non-liability to get out of order with cheapness of manufacture. It consists in the use of a flat iron bar (the proportion of its depth to thickness being about 3 to 1) running upon its edge between grooved rollers contained in cast-iron brackets. To the front end is fastened the wire to the signal, and to the other is attached a chain, having a weight at the end of it sufficient to keep the wire in a state of tension. Upon this bar slides a frame containing two clutch blocks. So long as this frame remains at 90 deg. the bar is free to move backwards or forwards between its rollers, as expansion or contraction may require, but when pulled so as to decrease the angle, the blocks seize the bar and draw it through its rollers a sufficient distance to efficiently work the signal. This machine has been at work for nearly five months upon a signal distance five-eighths of a mile, situated at the West Junction Box, Reading, Great Western Railway. Ever since it has thoroughly fulfilled its object, and given the greatest satisfaction. Two machines have also been applied and at work for some time on two signals, semaphore and disc and cross bar, five-eighths of a mile distant each, at East Box, Reading Station, and have given every satisfaction.

Papers "On the Determination of the Form of Dome of Uniform Stress," by Mr. C. W. Merrifield, F.R.S.; "On Safety Facing Front Lock for Railways," by Mr. Richard Luke; and one by Mr. R. Morgan "On Tuyeres for Smiths' Forges," were also read.

A paper was read by Mr. George Fawcus "On a New Method of Isometrical Drawing." The improvement consists in the facility for producing drawings of this description by the use of an equilateral triangle drawing board, and the T square, by means of which the special angles are readily set off.

This section on Saturday visited various engineering and industrial establishments in the busy town of Belfast. A party, headed by the President, Professor James Thomson, by special invitation, had the privilege of inspecting the extensive works and shipbuilding yard of Messrs. Harland and Wolff, Mr. Harland himself taking charge of the party and directing attention to the principal points of interest to be observed. Here was seen in the course of construction. for the White Star line, the Germanic, sister ship to the Britannic, to which attention had been called in the section on Friday as fitted with Mr. Harland's screw lowering apparatus. The Germanic is 460 feet on the water line, 45 feet beam, is of 5,000 tons burden, and is fitted with every known appliance for ensuring facility of handling and working the ship, as well as the comfort of the passengers.

Monday's business was commenced with a paper by Mr. Jeremiah Head, of Middlesborough, in which he treated of "The Higher Education of Engineers'."

This was followed by two papers by Mr. W. Froude, the one on "Surface Friction," being a sequel to that on this subject presented at the previous meeting of the Association at Bradford, the other detailing "Experiments on the Resistance of a full-sized Ship at various speeds." Any attempt to abstract these papers would be useless; to the general reader they could not be made intelligible, and as regards the professional man he could only be satisfied by consulting the papers in their entirety, and for this opportunity will be afforded, as they will appear at full length in the printed *Transactions* of the Association.

Mr. T. Neville then laid before the Section a paper detailing "The Means adopted for the Improvement of the Navigable Channel of Dundalk."

A "Differentiating Waste-Water Meter" was described by Mr. G. F. Deacon. The object of this meter is the provision of a means of detecting waste where the system of constant supply is in operation. Mr. Deacon, who is engineer to the Liverpool Water-works, stated that such meters were largely in use at that place, and with great success. There were now forty-one at work there. This simple form of meter draws a diagram on ruled paper revolving on a drum driven by clockwork, which indicated in gallons per hour the rate of flow through it for every instant during the day or night. This is effected by the rising and falling of a disc in a conical vessel through which the flow passes, and as the disc rises or falls to meet the exigencies of the flow, it causes a pencil to trace on the paper a diagram as above named. The importance of a means of detecting waste where the constant supply is in use can scarcely be over-rated. The President, in conclusion, said, in connexion with this subject, that the introduction into every house of a cheap meter of some description would be most valuable.

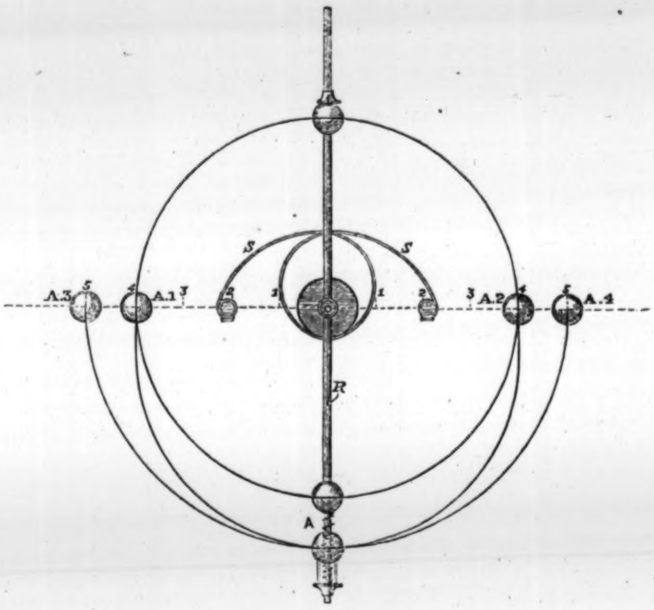
A paper, descriptive of the Coal-field of Tuscan Maremma, and of the operations at present going on there for the winning of coal, was presented to the Section by Mr. P. Le Neve Foster, jun.

A paper, by Mr. F. H. Varley, descriptive of "a means for taking up the inertia" in the case of reversing engines was then read. The importance of this paper was fully acknowledged, and we hope Mr. Varley will enable us to present it to our readers at a future time.

On Friday (August 21) Mr. Bottomley described an arrangement, invented by Sir William Thomson, for testing experimentally the plan adverted to in the President's Address, for producing the alternations of light and darkness as signals defining the special light to which it is attached. Dr. Gladstone and others, in the discussion, spoke strongly in favour of the introduction of the system in lighthouses generally. The apparatus was shown in actual work on the Holywood Harbour Lighthouse on Saturday evening, by permission of the Harbour Commissioners of Belfast.

Mr. Harland, of the well-known shipbuilding firm of Harland and Wolff, of Belfast, then described, and illustrated his description by a series of elaborate models, his plan for raising and lowering the screw in ships. He said that in some voyages, and especially during those across the Atlantic, the wave line on the side of the ship was very often such as to leave the ordinary screw half-exposed. Under these circumstances, the engines had only half the work to do, and consequently were apt to run off at such speed as to injure the machinery. The consequence was that the engineer had to throttle or cut off a considerable portion of the steam, and the speed of the vessel was much reduced. To obviate that, he proposed a plan for lowering the screw, which was being introduced, enabling the engineer in heavy weather to keep the vessel going much steadier, with practically very little reduced speed. A large amount of useful power was thus utilized, with the advantage of a uniform motion. Instead of the engineer being obliged, at different parts of the day, to slow the engines, he was independent of the weather, which became merely a matter for the consideration of the captain. In crossing a bar, or when in shallow water, the tips of the screw must not be lowered beneath the keel. The normal position of the screw was that the tip should be in a line with the keel; but when the vessel was in more water than she really required, the captain gave directions to the engineer to lower the screw, in performing which operation no change was necessary in the speed of the engines, and in that position the vessel crossed the ocean. On arriving near port, the captain gave a counter order to raise the screw. In order to prevent it coming in contact with fishermen's nets or other obstacles, a small shoe was slipped out, when necessary, under the screw. In Liverpool, the demand for admission into the graving docks by vessels which had broken or injured their screws, was often so great that it was found impossible to accommodate them all, and the consequence was that many vessels had to enter on another voyage with their screws in an injured condition. To meet this difficulty it was proposed to elevate the screw to such a position as, when the vessel was half discharged, the screw could be repaired, and then lowered.

NOVEL EXEMPLIFICATION OF CENTRIFUGAL FORCE.



THE diagram shows a plan view of a ball, A, on a horizontal rod, R, attached to a central pivot, deriving oscillating motion from a series of springs, S; those on one side being independent of those on the other side, and all being shown with their power expended, or in a neutral state.

The diagram is divided diametrically by a dotted line into five equal parts on each side of the centre, to denote the respective leverages and corresponding number of springs to be employed.

The rod is shown at its maximum position, being half the traverse of the orbits.

First Example.—The ball, being fixed on the rod, is started at A1 with the power of four springs; it will then traverse the circular orbit to the position A2 in a given time, say five periods, forcing back the opposite four springs.

Secondly.—The ball, also fixed to the rod, is started at A3 in the larger circular orbit with the power of five springs, it will then travel to the position A4 with a greater velocity in an equal time, forcing back five springs.

Thirdly.—The ball, being free to move along the rod, is started with five springs from A1; it will then traverse the elliptical orbit, and, by its centrifugal force, compress the coiled spring on the rod.

Its velocity, at the moment of starting, will be greater than in the preceding example, by reason of the extra spring and the decrease in the leverage or distance from the centre, but its speed will gradually diminish as the ball recedes into the larger orbit, and it will reach the maximum point at exactly the same speed as before, but in a less time, and will then complete its elliptical orbit to the position A2 in another equal time and relative speed—the coiled spring returning the ball to the small orbit—the total time of its traverse being 4½ periods.

Fourthly and lastly.—The ball, being free on the rod, is again started from A1, in the first half of the elliptical orbit, by the five springs, but at the instant of reaching the maximum point it is held by a stop on the rod, and consequently travels to the position A4 on the large circular orbit, the total time of its traverse being 4¾ periods.

But, in addition to the complete traverse of the orbit against the counteraction of the five springs, the ball will have compressed the coiled spring, and thus have stored up a power equal to the centrifugal force of the ball, which force will be precisely equal to one fourth of the original power, and consequently the effect will be so much greater than the cause.

It will be seen that the diagram and description above given refer to novel and peculiar arrangements of mechanism which the inventor (E. Ludeke) affirms have been firmly proved and established by him, and he has already brought it into practical and mechanical effect by means of numerous models of the most accurate and varied construction, and also secured the invention by letters patent in Great Britain, and in most of the prominent foreign countries and the colonies. He purposes to still further exemplify his discovery by future applications.

It is quite unnecessary to comment on the extreme importance and value which such a subject must present to the mind of every scientific man, since it will naturally suggest a revolution in motive power, and in the means whereby power can be obtained. It is clear it will involve sweeping changes in details of construction and in the calculation of forces.

The inventor affirms that the economy in every possible sense will be enormous, and that a national benefit of untold value must result from the inevitable introduction of the invention, and the superseding of the ordinary means and machinery for obtaining and applying motive power for various purposes required throughout the civilized world. We trust that this important subject will receive the consideration and discussion it deserves.

ATTERBURY'S IMPROVEMENTS IN TUNNELLING AND PERMANENT WAY FOR SEA AND LAND.—We have received a communication from Mr. Atterbury as to his invention relating to the above important subjects, but we are unavoidably compelled to postpone its insertion.

We understand that the first volume of the Observations made at the Observatory of H.H. the Rajah of Travancore, under the direction of Mr. Brown, F.R.S., is now through the press. This volume contains eighteen years' observations of magnet declination.

BESSEMER STEAM SHIP.—This splendid vessel was launched from Earle's shipbuildingyard, Hull, on Thursday, 24th Sept., 1874.

Mr. Spottiswoode has resigned the position of Treasurer of the British Association, and Prof. A. W. Williamson, of University College, London, has been appointed his successor.

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THE INVENTORS' INSTITUTE,

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE, LONDON

ESTABLISHED 1ST MAY, 1862.

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SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President of Council:

SIR ANTONIO BRADY.

TO MEMBERS OF COUNCIL.

Council Meeting on Thursday, October 15th.
New Session commences in November.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.
F. W. CAMPIN, Sec.

Proceedings of the Institute.

At the meeting on 10th September, after disposing of routine business, the Secretary referred to the decease of Sir William Fairbairn, one of the Vice-Presidents of the Institute, and after some observations by various members Mr. F. H. VARLEY moved, Mr. WILLIAM HARRIS seconded, Mr. CARTTAR and Mr. MORGAN supported the following resolution, which was carried unanimously:—

"The members of the Inventors' Institute hereby present to the family of the late lamented Sir William Fairbairn, Baronet, C.E., D.C.L., LL.D., F.R.S., &c., one of its Vice-Presidents from the time of its establishment, the tribute of their sympathy and condolence in the great loss sustained by his decease, a loss which is heavy, not only for this Institute, but for the whole scientific world, and one that will be regretted wherever civilisation has rendered practical science a matter of consideration and importance—the Inventors' Institute acknowledging the decease of Sir William Fairbairn to be deprivation of the valuable aid of an eminent supporter of the inventor's cause."

This resolution having been duly forwarded to Sir Thomas Fairbairn, the son and successor of the late Sir William, the following was returned:—

"Brambridge House, Bishopstoke. Dear Sir,—I have to acknowledge your letter of the 14th inst., and I beg you will convey to the Council of the Inventors' Institute the grateful thanks of myself and the several members of our family for the resolution in which the members have expressed their sympathy and condolence in the great loss we have sustained by the death of my father. Sir William always adhered stedfastly to the justice of the laws which secure to an inventor the substantial rewards which flow from his discovery. Admitting that the Patent Law of this country was capable of improvement, he never countenanced the movement which seeks its entire abolition. He took a warm interest in the proceedings of your Institute, and believed the inventors' cause would be greatly benefited by its activity and prosperity.—I have the honour to be, dear Sir, very truly your obliged, THOMAS FAIRBAIRN.—To F. W. Campin, Esq., Secretary of the Inventors' Institute.

Members recently admitted.—H. Bradley, T. Slater, J. Jowett, John F. Molony, G. Eyre, W. Beck, J. Kaye, F. Wright.

Monthly Notices.

The Iron and Steel Institute held a meeting at Barrow, on September 1st to 4th. Several papers of considerable interest were read, and interesting excursions to the works in the neighbourhood made.

Mr. A. Heatherington has just issued his annual review of the Mining Industries of Nova Scotia. We find that in 1873, in Nova Scotia proper and Cape Breton Island, 1,051,467 tons of coals were raised, and that the yield of the Nova Scotian gold mines, from the commencement of operations in the autumn of 1860 to the close of the year 1873, approximated in value to £911,000.

The Austrian Polar Expedition.—The expedition, now happily concluded, discovered land on the 31st of August, and in the beginning of October the floe on which the ship was fixed attached itself to the land ice, about two miles from the land; this was in lat. 78deg. 51min. N., long. 59min. E. Here the ship was, of necessity, obliged to winter. Snow-houses were erected, and a series of observations, meteorological, magnetical, and astronomical, were commenced, and continued for four months. In March and April, 1874, Lieut. Payer explored the land, and attained the latitude of 82deg. 5min., from which position land could be seen to latitude 83deg. Many bears were seen, but no other quadrupeds. On the 20th of May the crew abandoned their ship, and after many vicissitudes, on the 15th of August they were in latitude 78deg. 4min. and longitude 61deg. E three days, on which date they sighted Novaya Zemlya, and without stopping at Barents Island, where they had left a depôt of provisions, they proceeded towards Cape Nassau, and tried in vain to find a ship at Matthew Strait. After rounding Cape Britwin, they fell in with a Russian schooner, which conveyed the whole party to Norway, where they met with a warm and hospitable reception; and lately they have been gloriously *fêted* at Vienna.

The Rodriguez party for the observation of the Transit of Venus arrived at Port Louis, and according to arrangements, have already left for their destination, taking with them a portion of the instruments, their huts, and other necessaries. The remainder of the baggage will probably follow in about three weeks. Thus far everything has gone well, and the advices of Rodriguez received here are, on the whole, encouraging.

French Experiments on Sound.—The French Government has appointed a commission to conduct experiments upon a steam organ, called "The Calliope," which can, it is said, be heard fifteen leagues in fine weather at sea. These experiments are to be made during the period of the equinoctial gales.

Temperature of Ocean Currents.—Dr. Neumayer has presented to the Geographical Society of Berlin a photographic apparatus for determining these currents at the greatest depths of the ocean. The apparatus is essentially a thermometer fixed in a copper bottle, with a piece of photographic paper on one side of it, and charcoal points as the terminal poles of an electrical apparatus; the connection is made with the battery, and the electric light produced marks the height of the mercury in the thermometer on the photographic paper.

Japanese Coals.—Mr. Henry S. Munroe has just published his report on Yesso coal, in which he says, Japanese coals are widely removed in composition from all coals of similar age, and can be compared with the best carboniferons coals; they are, therefore, neither *lignites* nor *brown coals*, but true bituminous coals.

Vanilla from Pine-trees.—The fine odour of recently-felled and barked pine-trees in spring time will be familiar to most. In *Berichte der Deutschen Chemischen Gessellschaft zu Berlin*, Ferd. Tiemann and W. Haarmann, in a paper "On Coniferin, and its Conversion into the Aromatic Principle of Vanilla," show that the juice scraped from the recent bark yields by digestion coniferin which is at first inodorous, but which in the course of time acquires the odour of Vanilla.

Sir David Brewster's Life of Newton.—Messrs. William Tegg and Co. have in the press a new edition of this work, carefully revised and illustrated with notes, where recent information made them desirable, by Mr. W. T. Lynn, of the Royal Observatory, Greenwich.

The Report of the Meteorological Committee of the Royal Society for the year 1873 has just been published. The system of weather warnings seems to have been fairly successful. In 1873, out of every hundred warnings, very many were justified by the subsequent results.

Reviews.

VALUE OF SEWAGE DENIED.

"The Sewage Difficulty Exploded. Disposal of Sewage, Purification, and not Utilisation being the Main Object; Farming; Farm-yard and Artificial Manures. Purification of Sewage Simply a Matter of Expense." A Paper read before the Association of Municipal and Sanitary Engineers and Surveyors at their first Annual Meeting at Birmingham—the Discussion at the Sewage Congress on the following day, and a Description of the Birmingham Method of Sewage Disposal. With additions and preface. By EDWARD MONSON, Assoc. Inst. C.E., Consulting Engineer, Surveyor to the Acton Local Board, London, W. 1874. London: E. and F. N. Spon, 48, Charing Cross.

THE author of this short but valuable treatise is in opposition to the popular notion that sewage such as we have usually to deal with, namely, liquidised excreta, is of any practical or commercial value, because of the difficulty of properly treating it and of rendering it portable. He, however, appears to consider that in many cases sewage may be usefully applied in irrigation, for he says:—

Sewage irrigation is for the purpose of purifying the water which has been employed for the removal of town refuse, and to utilise it by growing suitable crops. The sewage intended for irrigation should be filtered, as it is found in practice that if untreated sewage be applied to grass land the insoluble portions and undecomposed organic matter is deposited on the leaves of the plant; and it is of the utmost importance that it should be kept continually in motion, no part being allowed to remain stagnant; for, although water is essential to vegetable life, an excess of moisture is injurious to all but aquatic plants.

SEWAGE FARM.—A sewage farm is land laid out for the purpose of purifying and utilising the sewage of towns by growing suitable crops.

There is some prejudice against sewage farms, but the people who complain of them would also complain of manuring land in the ordinary style of farming. The odour is never pleasant, and manure is of little value unless it be decomposed.

The land is the proper place for town refuse, and if sewage be disagreeable to the sense of smell it is not a nuisance injurious to health when upon land, and can in no way be compared with the decomposition of animal and vegetable matter in the close neighbourhood of towns.

The selection of a situation for a sewage farm is a matter of great importance, for if it be situated at a higher level than the outfall sewer the sewage must be pumped, and this will necessarily entail considerable expense in the first instance for plant, and an annual outlay for working expenses, which outlay will not be required if the farm be situated at a lower level than the outfall sewer, so that the sewage can be utilized by gravitation, and this will make all the difference as to whether the farm will pay or not.

The soil must be of a permeable character, with a gravelly or sandy subsoil if possible; for if the soil be a stiff clay, for instance, the sewage cannot enter it so as to become purified, and the clay will not dry so as to be ready for another application.

The surface of a sewage farm requires to be levelled, so that the sewage may flow equally; and it requires to be laid out with carriers having a proper inclination and lined with earthenware, concrete, or clay, so as to prevent the sewage sinking into the ground during its passage along them.

The sewage is brought to the highest part of the ground to be irrigated by pipes fitted with sluice valves, and is then discharged by hydrants into the carriers and distributed over the surface of the ground as required.

Good drainage is necessary to remove the water which has been used, and good roads are necessary to remove the produce of the farm.

PROPERTY OF MARRIED WOMEN.

"The Early History of the Property of Married Women, as Collected from Roman and Hindoo Law." A lecture delivered at Birmingham, March 25, 1873. By Sir HENRY SUMNER MAINE, K.C.S.I., D.C.L., Member of the Council of India and Corpus Professor of Jurisprudence in the University of Oxford. Manchester: A. Ireland and Co., Printers, Pall Mall.

WHEN Sir Henry Maine speaks on ancient law and its effect on modern legal systems, we listen as to a master, and are not disposed to criticise, but to receive his statements as the instructions of so learned a teacher that there is no room to dispute his authority.

The subject-matter of the pamphlet now before us is one of the most important topics of the present day, for the course of modern civilisation has tended to give to women an independent position and individual responsibilities which have not heretofore been attributed to them; but though this be true, yet, as Sir H. Maine reminds us, the ancient Romans, and even the ancient Hindoo, as it seems, long ago recognised, as regards property, the individuality of women as distinct from the husband and the family, or the tribe; and the Roman law, more or less modified, has, for a long time past, been adopted by most civilised States, though it it only quite recently, under the Married Women's Property Act, that we have arrived at a similar institution, since money settled to a wife's separate use, which has been long legalized among us, though practically the same thing, required a settlement to create it.

Sir Henry having, as regards Roman civil laws, treated this question in detail, adds:—I have now abridged a very long, and, in some portions, a very intricate history. The Roman law began by giving all the wife's property to the husband, because she was assumed to be, in law, his daughter. It ended in having for its general rule that all the wife's property was under her own control, save when a part of it had been converted by settlement into a fund for contributing to the expenses of the conjugal household. But, no doubt, the exception to the general rule was the ordinary practice. In all respectable households, as now on the Continent, there was a settlement by way of *dos*. Not that we are to suppose there was among the Romans any such form of contract as we are accustomed to under the name of marriage settlement. The mechanism was infinitely simpler. A few words on paper would suffice to bring any part of the wife's property under the well-ascertained rules supplied by the written law for dotal settlements, and nothing more than these words would be needed, unless the persons marrying wished to vary the provisions of the law by express agreement. This simple, but most admirable, contrivance of having, so to speak, model settlements set forth ready made in the law, which may be adopted or not at pleasure, characterises the French Code Napoleon, and it was inherited by the French from the Romans.

With regard to the Hindoo law of what is termed *Stridhan*, which originally included, according to the institutes of Manu, "all the property which a woman may have acquired by inheritance, purchase, partition, seizure, or finding," and this is a comprehensive description of all the forms of property as defined by the modes of acquisition, has not, however, in the existing Hindoo law this amplitude, or anything like it. The successive generations of Hindoo commentators have shown their hostility to it, not by abolishing it, but by limiting to the utmost of their power the circumstances under which it can arise. Minute distinctions are drawn between the various modes in which property may devolve upon a woman, and the conditions under which such property may become *Stridhan* are made as rare and exceptional as possible. The aim of the lawyers was to add to the family stock, and to place under the control of the husband as much as they could of whatever came to the wife by inheritance or gift; but whenever the property does satisfy the multifarious conditions laid down for the creation of the *Stridhan*, the view of it as emphatically woman's property is carried out with a logical consistency very suggestive of the character of the ancient institution on which the Brahminical priests made war. Not only has the woman singularly full power of dealing with the *Stridhan*—not only is the husband debarred from intermeddling with it, save in extreme distress—but, when the proprietress dies, there is a special order of succession to her property, which is manifestly intended to give a preference, wherever it is possible, to female relatives over males.

Let me add, says Sir Henry Maine, that the account which I have given you of the probable liberality of the Hindoo institutions to females at some long past period of their development, and of the dislike towards this liberality manifested by the Brahminical lawyers, is not to be regarded as fanciful or purely conjectural, although, doubtless, we can only guess at the explanation of it. It is borne out by a very considerable number of indications, one of which I mention as of great but very painful interest. The most liberal of the Hindoo schools of jurisprudence, that prevailing in Bengal Proper, gives a childless widow the enjoyment of her husband's property, under certain restrictive conditions, for her life; and in this it agrees with many bodies of unwritten local custom. If there are male children, they succeed at once; but if there are none, the widow comes in for her life before the collateral relatives. At the present moment, marriages among the upper classes of Hindoos being very commonly infertile, a very considerable portion of the soil of the wealthiest Indian province is in the hands of childless widows as tenants for life. But it was exactly in Bengal Proper that the English, on entering India, found the suttee, or widow-burning, not merely an occasional, but a constant and almost universal practice with the wealthier classes, and, as a rule, it was only the childless widow, and never the widow with minor children, who burnt herself on her husband's funeral pyre. There is no question that there was the closest connection between the law and the religious custom, and the widow was made to sacrifice herself in order that her tenancy for life might be got out of the way. The anxiety of her family that the rite should be performed, which seemed so striking to the first English observers of the practice, was, in fact, explained by the coarsest motives; but the Brahmins who exhorted her to the sacrifice were undoubtedly influenced by a professional dislike to her enjoyment of property. The ancient rule of the civil law, which made her tenant for life, could be got rid of, but it was combated by the modern institution which made it her duty to devote herself to a frightful death.

If the *Stridhan* of the Hindoos is a form of married women's separate property, which has been disliked and perverted by the professional classes who had the power to modify it, the institution which was first the *dos* of the Romans, and is now the *dot* of Continental Europe, has received a singular amount of artificial encouragement. I have endeavoured to describe to you how it originated, but I have yet to state that it entered into one of the most famous social experiments of the Roman Empire. A well-known statute of the Emperor Augustus, celebrated by Horace in an official ode as the prince's greatest legislative achievement, had for its object the encouragement and regulation of marriage and the imposition of penalties on celibacy. Among the chief provisions of this "Lex Julia et Papia Poppœa"—to give its full title—was a clause compelling opulent parents to create portions, or *dotes*, for their marriageable daughters. This provision of a statute, which very deeply affected the Roman law in many ways, must have met with general approval, for at a latter date we find the same principle applied to the *donatio propter nuptias*, or settlement on the married couple from the husband's side. In the matured Roman law, therefore, regular as it may seem to us, parents were under a statutory obligation to make settlements on their children.

It has been rather the fashion to speak of these experiments of the Roman Emperors on public morality as if they totally miscarried—I suppose, from some idea that the failure added to the credit of the moral regeneration effected by Christianity. But, as a matter of fact, the Christian Church conferred few civil benefits of greater moment to several generations of mankind than in keeping alive the traditions of the Roman legislation respecting settled property, and in strenuously exerting itself to extend and apply the principles of these disciplinary laws. There can be no serious question that in its ultimate result, the disruption of the Roman Empire was very unfavourable to the personal and proprietary liberty of women. I purposely say, "in its ultimate result," in order to avoid a learned controversy as to their position under purely Teutonic customs.

The importance and interest of our subject, when treated in all its bearings and throughout its whole history, are quite enough to excuse me, I trust, for having detained you with an account of its obscure beginnings. It has been said that the degree in which the personal immunity and proprietary capacity of women are recognized in a particular state or community is a test of its degree of advance in civilization; and, though the assertion is sometimes made without the qualifications which are necessary to give it value, it is very far indeed from being a mere gallant commonplace. For, inasmuch as no class of similar importance and extent was, in the infancy of society, placed in a position of such absolute dependence as the other sex, the degree in which this dependence has step by step been voluntarily modified and relaxed, serves undoubtedly as a rough measure of tribal, social, national capacity for self-control—of that same control which produces wealth by subduing the natural appetite of living for the present, and which fructifies in art and learning through subordinating a material and immediate to a remote, intangible, and spiritual enjoyment. The assertion, then, that there is a relation between civilization and the proprietary capacities of women is only a form of the truth that every one of those conquests, the sum of which we call civilization, is the result of curbing some one of the strongest, because the primary, impulses of human nature. If we were asked why the two societies with which we have been concerned this evening—the Hindoos on the one hand, and the Romans and all the races to which they have bequeathed their institutions on the other—have had so widely different a history, no reply can be very confidently given, so difficult is it, among the vast variety of influences acting on great assemblages of men, to single out any one, or any definite number of them, and to be sure that these have operated more powerfully than the rest. Yet, if it were absolutely necessary to give an answer, it would consist in pointing to the difference in their social history which has been the subject of this lecture, and in observing that one steadily carried forward, while the other recoiled from, the series of changes which put an end to the seclusion and degradation of an entire sex.

This short treatise, which has been presented to the world as a lecture, and is reprinted (with permission) by the Married Women's Property Act Committee, forms part of an unfinished work, and it is truly interesting, and worthy of serious consideration at the present time; but, as regards the progress of the question as to married women's separate property, we feel bound to say that there is great danger of immense social mischief being effected by any law in favour thereof, if conceived in the *ad captandum* fashion of the present Married Women's Property Act, which actually confers proprietary rights without concomitant responsibilities, a system every day losing good repute, and we think justly.

MR. TWINING ON TECHNICAL TRAINING.

"Technical Training." By THOS. TWINING (one of the Vice-Presidents of the Society of Arts.) Being a suggestive sketch of a National System of Industrial Instruction, founded on a general diffusion of Practical Science among the people. London: Macmillan and Co. 1874.

THIS is a work worthy of the best attention and respect of all who favour the progress of real knowledge, and one that will be acknowledged as of great value by every well-wisher of his country.

Mr. Twining, as is well-known, has for years past devoted much time, talent, and money to the promotion of movements for the advancement of the practical education of the people, especially seeking to promote what is termed physical and technical knowledge. He has taken up the subject *con amore*, and with regard to that branch of it which is likely to be the most readily understood and appreciated — domestic economy—he may be said to stand alone, he not being content with the inculcation of what ought to be done, but seeking to teach why it ought to be done; in point of fact, he is an educator of science in common things. The subject is so expansive and important, and this work is of so varied a character that we shall take the opportunity of treating it more fully on another occasion.

ARLON GRANGE.—By W. S. Gibbs. Critics' edition. London: Provost and Co., 36, Henrietta-street.—We are compelled to further postpone our review of this admirable work.

THE LATE SIR JOHN RENNIE.

Sir John Rennie, C.E., past President of the Institution of Civil Engineers, was born August 30, 1794. He first assisted his father, the late John Rennie, in building both Southwark and Waterloo Bridges. After the death of his father, in 1821, he succeeded to him as engineer to the Admiralty, a post he held for ten years. Among his more important works are London Bridge, for which he was knighted, Sheerness Dockyard, the completion of Ramsgate Harbour and Plymouth Breakwater, commenced by his father, the Earl of Lonsdale's Docks at Whitehaven, a portion of those of Cardiff, and the carrying out for a number of years of the great system of drainage and land reclamation in the Lincolnshire Fens. He was also the author of a noble work on Harbours, and of a monograph on Plymouth Breakwater. In conjunction with his brother, the late Mr. G. Rennie, he contributed to introduce the screw propeller into the Navy, and erected the machinery for the Mints of Calcutta, Bombay, and Mexico. Also they erected the Royal Clarence Victualling Yard at Plymouth, and Sir John Rennie was the first to perceive the uses of the diving-bell in engineering works. Sir John Rennie was a high authority on all subjects connected with hydraulic engineering, harbours, canals, drainage, irrigation, the storage of water, and the management of rivers, and his pamphlets on the drainage of Lombardy procured him the order of St. Maurice and St. Lazarus. Sir John possessed a wide reputation on the Continent, as may be gathered from the fact that he constructed the Harbour of Ponte Delgada, in the Azores, that he was Knight of the Tower and Sword of Portugal, of the Wasa of Sweden, and was also a member of the Academy of Science of Stockholm, and of the Austrian Society of Civil Engineers. Besides belonging to most of the scientific and learned societies in the metropolis, Sir John was long an active member of the Royal Society and the Meteorological Committee, and one of the Council, and was also Chairman of the Juries at the Exhibition, 1862. Of late years, owing to age and increasing infirmities, he retired almost entirely from active life and public notice, and, finally, died September 3, 1874. His kindness of heart won him many friends, and while numbers will regret his loss, he has left few enemies.—*Athenæum*.

TREATMENT OF CHINA GRASS FIBRE.

DR. COLLYER, who years since so richly earned the gratitude of mankind by his important discovery of producing painless surgical operations, by the inhalation of narcotic and stimulating vapours, of the class known as ether, chloroform, &c., has lately invented a mechanical contrivance for the treatment of Rhea-Ramie, or China grass. In 1870 the Government of India offered a prize of £5,000 for this invention. We have been informed that the method invented by Dr. Collyer is so perfect that a single person is enabled to prepare 200 lbs. in eight hours of the clean fibre, whereas at present the Chinese cannot clean or remove the epidermis, or skin, of from more than 2 lbs. per man in 10 hours. It is needless to say that this invention has a great value, and will enable this most precious silken fibre to be generally used in the manufacture of the finest textile fabrics. When prepared the value will not exceed 8s. per lb., whereas silk is worth 40s. to 60s. The Ramie fibre, when mixed with silk, even to the extent of 50 per cent., gives great durability and lustre to the texture of the material. Its limited use in Europe has arisen from the want of a proper method to clean the stems of ths skin. Now that this great desideratum is effected the plant will be extensively cultivated, both in India and America, and brought into general use. Dr. Collyer has had many offers for his invention, but he prefers for the present not to dispose of it, except he obtains what he deems its true value—£50,000 for each of the countries in which he has secured a patent. The invention, it is considered, has only to be put to work in India and America in order to secure Dr. Collyer the sum he requires.

MEETINGS AND LECTURES AT BELFAST.

A lecture on "Common Wild Flowers considered in relation to Insects," was delivered in the Ulster Hall by Sir John Lubbock, Bart., M.P., and Professor Tyndall took the chair.

An entertainment by the Irish Temperance League to abstainers of the association took place.

The annual meeting of the Ray Society was held in Queen's College. Dr. P. L. Sclater, F.R.S. (in the absence of Sir John Lubbock), took the chair. The report presented to the subscribers stated that the arrears in the issue of the annual volumes, which had been long a cause of much inconvenience, had been at length overcome. Since the last meeting at Bradford, the two volumes for 1872 and 1873 had been distributed, and the third volume for 1874 was finished, and would be issued in October.

A lecture was delivered on Saturday evening in the Working Men's Institute, on "The Discovery of Oxygen," by Dr. Odling, F.R.S.. The interest taken by the population of Belfast in the meeting of the British Association, was evidenced by the fact that immediately after the doors were opened the hall was three parts filled, and before the time for the commencement of the proceedings, it was densely crowded. The chair was taken by Professor Tyndall.

APPLICATIONS FOR LETTERS PATENT.

(Continued from page 138.)

and J. Sanderson. Steam boilers.—S. H. Parkes. Additions to lamps.—H. Lomax. Sewing machines.—A. C. Henderson. Weft-winding machines and shuttles for carrying the cops (com.)—P. Sarkissian. Sewing machines.—H. Defries. Burners for lamps burning hydrocarbon oils.—J. James. Colour-printing, the same being applicable to the manufacture of show-cards and articles used for advertising and other purposes.—E. P. H. Vaughan, F.C S. Mode of treating phosphates of lime for manuring and other purposes (com.)—W. R. Lake. Process and apparatus for making illuminating gas (com.)—H. H. Doty. Method of and means for employing coloured lights for signalling from vessels at sea.—J. Eaglesham. Machinery for cutting coal and such like minerals, and also for haulage purposes.—I. L. Pulvermacher. Pin lock-safety-fasteners for instantly securing without sewing electrodes, galvanic, and magnetic pole plates and other articles and things together or upon fabrics or materials.

On June 23rd.—2173 to 2188.—M. Benson. Reaping and mowing machines (com.) (Complete specification.)—W. Titley. Locks and latches.—A. Dunn. Construction of roadways. —W. E. Gedge. Draught apparatus applicable to steam-engines (com.)—J. Henckel. Automatic couplings for railway carriages and waggons.—J. H. Johnson. Machinery or apparatus employed in the manufacture of printing type (com.)—R. H. Courtenay. Induction coils.—A. W. Buchan. Apparatus for shaping clay or similar materials.—B. Hunt. Preparation of ozone and azotic acid (com.)—M. J. Roberts. Brake specially applicable to window blind rollers.—G. W. Dyson and E. T. Ward. Method of operating upon old railway rails and rail ends for the utilization thereof to useful purposes.—J. Aubin. Millstones for grinding corn and other substances.—P. Gamboni. Pumps or apparatus for raising or forcing air or water.—W. Jones. Apparatus for registering the work done by cabs or other such conveyances.—B. R. Croasdale. Bag for phosphates, saltpetre, guano, and other like materials. —A. M. Clark. Papering or making up pins (com.)

On June 24th.—2189 to 2203.—G. Willett, R. J. Harris, and J. Lund. Ash closet.—C. Brakell. Means of diminishing the transmission of noise and vibration from the wheels to the bodies of vehicles.—J. Westwood and R. Baillie. Iron piles and columns.—W. Hayhurst. Construction of "governors" for marine and stationary steam engines.—J. N. Coxon. Valves and ports for compound steam engines.—G. T. Bousfield. Buttons and fastenings and apparatus for attaching the same (com.) (Complete specification.)—E. V. Bailey. Fixing door and other knobs.—F. R. A. Glover. Mode of bridling cables to anchors.—H. E. Newton. Gas burners (com.)—B. Brower. Inkstands.—G. H. Roberts. Apparatus to be employed in the manufacture of screws of vulcanite or other analogous material. A. M. Clark. Wheels of vehicles for common roads (com.)—F. Wirth. Machinery for the manufacture of bricks and similar objects (com.)—W. Macpherson. Indicator for cabs and other public vehicles.—S. P. M. Tasker. Metallurgical furnace. (Complete specification.)

On June 25th.—2204 to 2215.—I. R. Hayes and J. Somerset. Construction of frames for umbrellas and parasols.—W. H. Northcott. Steam generators.—F. Wirth. Bearings for axles and shafts of gun carriages, waggons, and other similar purposes (com.)—R. Wallwork. Means and apparatus for disconnecting the tender and engine from railway trains when there is an impending collision, or for any other necessity.—A. McDougall. Materials or compositions for destroying insects on animals, plants, and other objects, and for protecting them therefrom.—G. Haseltine. Gas engines (com.) (Complete specification.)—A. M. Clark. Breech-loading fire-arms and ordnance (com.)—J. H. Small. Apparatus for holding, punching, registering, and delivering tickets, chiefly designed for the conductors of omnibuses and tramway carriages.—A. W. Tooley. Apparatus for lifting sacks when filled with corn, seed, flour, coal, or other produce or merchandize.—W. Kennedy. Manufacture of uncoloured and coloured yarns. —F. Hawkins and S. Lawrence. Expansion governors.—A. A. Schlesinger. Lawn-mowing machine.

On June 26th.—2216 to 2224.—W. Drewett. Apparatus for blocking hats, bonnets, and such like articles.—S. Townsend. Endless bands. (Complete specification.)—C. Mohr and W. Shammon. Construction of wire muzzles for dogs and other animals.—S. Kell. Construction of corn and seed drills.—C. J. Tackels. Gas burners.—W. C. Stiff and J. Sheldon. Ties or bands for baling cotton, and for other like purposes.—E. Edwards and W. Wilkins. Attaching door and other knobs to their spindles.—E. H. Dean. Machinery for taking from the land corn, hay, or other cut crop, and lifting it on to waggons or other suitable conveyance for hauling it.—J. Lilburne, M.D. Mode of hermetically closing glass bottles or vessels.

On June 27th.—2225 to 2239.—S. Whitham. Machinery or apparatus for rolling iron, steel, and other metals, which relates more particularly to apparatus known as "three high system," to be used for rolling iron, steel, or other metals into plates or sheets, though parts of it are also applicable to rolls generally.—E. Weild. Process of and machinery for preparing sewing threads.—R. Fletcher. Window sash holders. F. H. Relph. Fittings for carrying cattle or other animals in vessels at sea.—E. Underwood and W. A. Phipson. Blind furniture.—J. H. Walsh. Tricycle.—F. Durand and A. Drouot. Machinery or apparatus for pressing or moulding bricks and other articles.—J. Bourdin. Means for transmitting motive power to sewing machines.—Hon. J. W. Plunkett. Generating steam in locomotive and other steam boilers.— A. L. Fyfe. Ladies' belts.—E. Oesterley. Duplex telegraphy, and apparatus to be used for this purpose (com.)—A. Martin. Apparatus for clipping or shearing animals.—E. S. Spencer. Horse shoes.—A. Wyley. Fire-arms.—H. P. Holt and W. Dawes. Machines for cutting grass plot edges.

On June 29th.—2240 to 2250.—T. Pasco and W. Hawkins. Manufacture of perambulators and apparatus used therein.—J. Oldfield. Apparatus employed in weaving.—J. Imray. Process of rendering alkalies caustic and apparatus for that purpose (com.) - G. Bischof. Water filters.— J. C. Wellens. "Wharle-tubes" employed in machinery for spinning wool and other fibrous substances.—O. V. Morgan and G. R. Moelchaerek. Stone ware filters and coolers for filtering and cooling water.—H. H. Murdoch. Closing the ends of metal pipes, and connecting and soldering metal pipes together, and the combination of metals or alloys for the latter purpose; parts of which are applicable to other purposes (com.) (Complete specification).—G. Browning. Sewing machines.—J. Burrell. Composition for coating the hulls or bottoms of iron ships to preserve them when in sea or other water, also applicable for the like preservation of any iron, wood, or stone.—B. French. Lubricating compounds.—W. R. Lake. Compounds for surfacing textile and other fabrics, and fabric produced by the combination of the same with textile or other substances, which compounds are also designed for use as a substitute for wood and other materials in the production of moulded articles for ornamental and other purposes (com.)

On June 30th.—2251 to 2273.—T. Thomson. Producing imitations of leather on cloth, paper, or other fabrics.—D. Barker. Construction of machinery for moulding and compressing artificial fuel and other substances.—J. Henchman. Cop-winding machines.—M. Mortimer and D. Bateman. Looms for weaving. (Complete specification.)—B. Hunt. Manufacture of sugar from the cane (com.)—J. Waugh. Smoke prevention. (Complete specification.)—E. P. H. Vaughan. Construction of mercurial air-pumps (com.)—W. S. Hall and R. McLeish. Apparatus for watering the floors of shops and warehouses, footpaths, platforms of railway stations, lawns, bowling greens, and for other like purposes.—W. R. Lake. Apparatus for smelting and other like purposes (com.)—H. Feldtrappe. Neckties with fasteners.—R. Carter and J. Ashwin. Fastening for solitaires, sleeve links, studs, and other articles of jewellery.—G. W. Bentley. Apparatus for the treatment of wool, cotton waste, yarn, hair, and other fibrous materials containing oil or fatty matters, and in the subsequent separation of the oil or fatty matters from the agents employed.— J. Shuttleworth. Steam engines.—J. Kippax. Method of producing certain descriptions of quilts or bed coverings.—G. W. Hart. Manufacture of iron and steel.—W. Horsfall and A. Greenwood. Manufacture of horse-shoes and the machinery to be employed therein—J. L. Murphy. Raising fluids.—W. Anderson. Reciprocating motive power engines.—J. C. W. Jefferys. Fastener for gloves and other articles of dress.—A. M. Clark. Manufacture of gas and fuel (com.)—A. M. Clark. Implement for sharpening knives and other table uses (com.)— W. Beatson. Manufacture of alum and products resulting therefrom.—T. Myerson. Process for treating blood for the manufacture of manure.

On July 1st.—2274 to 2291.—W. Connell. Valves for water-supplying apparatus. G. Ritchie. Framing of and the furniture for tents.—J. H. Betteley and W. Davison. Method and apparatus for issuing tickets to check fares, and for checking amounts generally wherever tickets are issued.—E. T. Hughes. Steel propellers (com.)—J. Beaumont. Means or apparatus for cleaning the teeth of carding engines.—J. D. de Savignac. Vaginal injection canula.—A. A. Trinquier. Breech-loading fire-arms for loading them with the left hand.—G. T. Mackley. Manufacture of horse and tip nails.—S. Corbett. Implements or machines for raising or lifting potatoes, for thinning and scuffling turnips or mangel wurtzel, and for cleaning and forking land.—F. H. Lloyd. Steam boilers or steam generators.—A. A. Pope. Air guns or pistols (com.) (Complete specification.)—W. Clissold. Construction of joint applicable to the securing of door and drawer knobs, walking stick, umbrella, and other handles, and to kindred uses.—J. Mass. Apparatus for indicating and registering the sums of money paid by passengers for journeys made in public vehicles, and for preparing tickets or vouchers for the same, part of which improvements are also applicable for other analogous purposes, in which numerous small sums of money are paid for articles supplied to the public.—J. R. Breckon. Manufacture of coke and the machinery employed therein. — G. Haseltine. Apparatus for syringing bottles (com.) (Complete specification.)—G. Haseltine. Combined scoop and sifter (com.) (Complete specification.)—U. Scott. Railway and other carriages, and various parts of the same, some of which may be used for other purposes.—G. Haseltine. Machine for making weavers' harness (com.) (Complete specification.)

On July 2nd.—2292 to 2312.—J. A. R. Bourgougnon. Breaking or stopping apparatus for cranes, winches, and other similar purposes.— W. Clark. Railway breaks.—G. Haseltine. Process and machinery for disintegrating fibrous substances (com.)—D. O. Edwards. Apparatus for the promotion of ventilation and other sanatory purposes.—E. Knowles and W. Fenton. Double doffer condensers.—J. Ward. Locomotive engines.—J. Parry. Construction of apparatus to be applied to roller blinds.—A. M. Fowler. Construction of privies and water-closets.—J. Parry. Fitting or "movements" for swing looking-glasses.—J. C. Newburn. Combing machines (com.)—F. C. Hathaway. Fastenings for purses, pocket books, bags, garters, braces, and other articles.—E. Warner and E. F. Woods. Method of hanging upon their axletrees the bodies of those carts which can be tippled to empty them of their contents.—E. F. Woods and W. Newman. Apparatus for feeding thrashing machines.—H. Schallehn. Brakes for omnibuses, tramway cars, carts, and other similar vehicles (com.)—R. Willacy. Mode of and apparatus for spreading or distributing manure or other substances, either solid or liquid, over the ground.—R. Hornsby and J. Bonnall. Thrashing machines.—J. Schloss. Cigarettes.—J. Lewis and William Jones. Machinery for moulding and compressing fuel and other materials into blocks or bricks.—E. Booth and H. Tetlow. Shuttles for weaving.—J. Manchester and W. A. Turner. Apparatus for gassing yarns and fabrics.—T. R. Oswald. A. Oswald, and W. R. Oswald. Marine steam boilers, and setting the same.

On July 3rd.—2313 to 2335.—J. Lewthwaite. Apparatus to be employed in detecting fire as it breaks out or is caused in ships, buildings, mines, and other places.—R. Spence. Interlocking levers for switches, points, and signals of railways.—J. Bentley. Sanitary apparatus or pump for raising and delivering sewage or other diluted refuse matter, said apparatus being also applicable for elevating and delivering water or other fluids.—J. Morrison. Covering and protecting points of lead pencils, as well as regulating said covering, applicable for artists, &c.—C. F. Bower. Rotary knife cleaner.—J. J. Kunstädter. Apparatus for causing the flow of liquids, and apparatus to obtain motive-power from the flow of liquids.—J. A. Briggs. Rendering steel and iron wares incorrodible.—J. G. N. Alleyne. Furnaces and rabbles for puddling.—G. L. Watson. Steering apparatus.—J. Wallace. Potato diggers.—H. Handyside. Coupling or joining together railway rolling stock.—W. H. Lascelles. Construction of roofs and other parts of buildings. —C. Dening and S. H. Dening. Agricultural drills.—W. M. Golden. Adjusting chair chiefly designed for hairdressers' and dentists' use.—W. G. Rawbone. Machines for sowing seeds and distributing manure (com.)—F. W. Colls. Safety valves.—J. B. Bradshaw. Hoops for securing bales.—F. W. Colls. Traps for preventing the escape of gases from sewers and drain pipes.—J. Parkinson. Sewing machines.—Jas. Walmsley, and Jhn. Walmsley. Warping or beaming machines.—W. Gadd. Perambulators —J. Morris. Devices for effecting instantaneous changes of costume in character-impersonations. —L. Barton. Manufacture of knitted fabrics, and in the machinery employed therein.

On July 4th.—2336 to 2348.—H. J. West. Manufacture of ice, and apparatus for that purpose.—W. Empson and W. Palmer. Construction of linen buttons, and which said improvements are also applicable to buttons covered with other fabrics.—J. Wells. Main cocks for gas and water purposes, but which improvements are also applicable for main cocks for the controlling of other fluids —W. Potter. Holders, suspenders, and clip fasteners for exhibiting ticketed and other articles, and such like purposes. A. A. Schlesinger. Lawn mowing machine (com.)—R. C. Mudge. Apparatus for turning the leaves of books, or exposing sheets or cards (separately or combined), part of which apparatus is applicable as a binder or holder for pamphlets and the like.—C. E. Barber. Bearings and journal boxes for shafting, and means of lubricating the same (com.)—C. E. Barber. Hubs or axle-boxes for loose pullies or wheels (com.)—H. W. Whitehead. Machinery for combing wool, cotton, flax, and other fibrous substances. —H. Percival. Manufacture of gas.—J. Scattergood. Manufacture of nuts for screws, and in machinery to be used in the said manufacture.—E. G. P. Thomas. Manufacture of blue coloring matter (com.)—J. Combe. Machinery for spinning, roving, and drawing fibrous substances.

On July 6th.—2349 to 2369.—G. Pendlebury. Ladies' dress improvers, and in the manufacture thereof.—J. Key. Preparing and using or applying for lubrication the composition known as hot-neck grease, commonly used as a lubricant to the journals of rolls, for hot metal rolling, or other like purposes.—G. A. Poole. Apparatus for indicating the depth of water under vessels. —G. Haseltine. Refrigerating apparatus (com.) (Complete specification).—R. Dobbie and P. Forbes. American stove or close cooking ranges, and in the mode and means of heating the water boilers connected therewith.—F. Groves. Double-acting and continuous brake for railway carriages and wagons.—T. Kendrick. Construction and fastenings of solitaires ,sleeve links, studs, and other articles of jewellery.—W. F. Braun. Manufacture of spiral springs.—J. Barling.—Treating hop bines and hop roots.—W. Gardner. Apparatus for training hops.—W. Absalom. Lowering, raising, and disengaging ships' boats, and in apparatus employed therefor. —F. Wirth. Charcoal furnaces (com.)—G. A. C. Bremme. Valve gear for steam and other motive power engines and steam pumps, which valve gear is particularly adapted for working steam steering gear.—H. A. Bonneville. Machinery for sowing potatoes (com.)—J. Mac. Naughton. Machines for the manufacture of cartridges, applicable for resizing, recapping, and reclosing spent cartridge cases.—B. F. Stevens. Motive power engines (com.)—A. Partridge. Apparatus or staff to be used for gauging or indicating the irregularities on the surfaces of millstones.—A. M. Clark. Apparatus for making soap bubbles (com.) (Complete Specification). —N. D. Spartali. Boilers and furnaces.—W. R. Lake. Machinery for rolling metal (com.)—W. Cotter. Stair tread and paving block.

On July 7th.—2370 to 2391.—F. A. B. Rosenwald. Economical paper cravats feigning silk cravats.—W. Walker. Direct-acting steam pumping engines.—T. Cluderay. Method of and apparatus for separating flints and hard stoney substances from foreign beans and wheat. (Complete specification.)—W. Clark. Apparatus for clipping horses or other animals.—G. H. Forbes. Manufacture of cements.—S. Hart. Carriages for common roads.—J. T. Wright and W. H. Laidler. Machinery for dressing, hackling, drawing out and straightening fibres of silk, flax, hemp, manilla, jute, and other fibrous substances.—W. H. J. Bergner. Horse capstans.—J. Walton. Instrument for cutting hedges and for other similar purposes —E. Rowland. Apparatus for regulating the admission of air to steam-boiler and other furnaces, and for indicating the requisite opening for the dampers of the same.—E. E. Bean. A pneumatic electric gas lighting apparatus. (Complete specification.)—T. Harding. Pneumatic apparatus for working brakes.—J. Liston, jun. Treatment and preparation of pipeclay, and the manufacture of tobacco-pipes and other articles therefrom, and machinery or mechanism to be employed therefor —W. Morgan-Brown. Seam stitching and cloth stretching machine (com.)—J. H. Johnson. Steam boilers (com.)—B. S. Lloyd. Construction of cartridges for blasting purposes (com.)—T. Green and W. Burrows. Machines for clipping or cutting grass edges. —J. C. Fooley. Manufacture of bread and biscuits.—G. T. Bousfield. Propulsion of ships and vessels (com.) (Complete specification)—A. M. Clark. Printing fabrics (com.)—A. M. Clark. Signal lanterns (com.) (Complete specification.)—W. C. Wilson and J. B. Candlish. Machinery for making cigars (com.)

On July 8th.—2392 to 2404.—J. Tatham. Apparatus for feeding wool, cotton, or other fibrous materials to carding or other machines.—E. Taylor. Construction of driving and reversing gear for washing, wringing, and mangling machines.—W. Spence. Couplings for railway carriages (com.) – J. Ireland. Process of and apparatus for reducing ores of manganese and other metallic oxides.—M. Dodds. Picks.—H. Wilson. Apparatus for cooling and heating liquids and gases.—J. H. Johnson. Construction of columns, piers, lighthouses, and other buildings, and the apparatus employed therein (com.)—T. O'Hara, T. H. K. Lees, and W. Jackson. Preparing silk or other fibres for combing. — J. Bullough. Long collars of throstles, doublers, and similar machines (partly com.)—J. Lewis. Application of brake power to vehicles drawn by horses or other animals.—W. R. Lake. Compound to form surfaces for the ignition of safety matches (com.)—H. Morgan. Apparatus for preventing the vibration or rattling of sliding windows, and for retaining them in various positions.—H. E. Cooper. Means of and apparatus for carburetting air or gas for illuminating or heating purposes.

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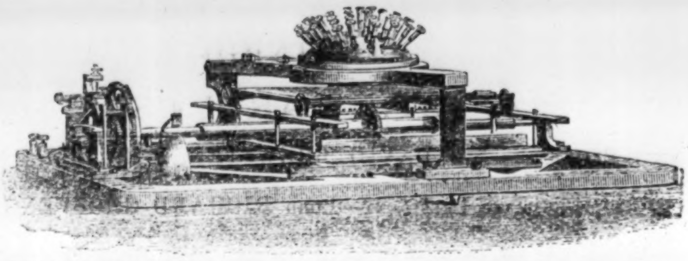

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